VOLUME XXXIV NUMBER THREE

THE NATIONAL GEOGRAPHIC MAGAZINE

SEPTEMBER, 1918

CONTENTS

Ships for the Seven Seas
With 23 Illustrations — RALPH A. GRAVES

The American People Must Become Ship-minded
With 8 Illustrations — EDWARD N. HURLEY

Our Industrial Victory
With 17 Illustrations — CHARLES M. SCHWAB

The War and Ocean Geography
With 7 Illustrations

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

$2.50 A YEAR

COPYRIGHT, 1918

XUM

NATIONAL GEOGRAPHIC SOCIETY

HUBBARD MEMORIAL HALL

SIXTEENTH AND M STREETS, WASHINGTON, D. C.

O. H. TITTMANN . . . PRESIDENT
GILBERT H. GROSVENOR, DIRECTOR AND EDITOR
JOHN OLIVER LA GORCE . ASSOCIATE EDITOR
O. P. AUSTIN . . . . . SECRETARY
JOHN E. PILLSBURY . . VICE-PRESIDENT
JOHN JOY EDSON . . . . . TREASURER
GEORGE W. HUTCHISON, ASSISTANT SECRETARY
WILLIAM J. SHOWALTER . ASSISTANT EDITOR
RALPH A. GRAVES . . ASSISTANT EDITOR

BOARD OF MANAGERS

1916-1918

FRANKLIN K. LANE
Secretary of the Interior

WILLIAM HOWARD TAFT
Formerly President of the United States

C. M. CHESTER
Rear Admiral U. S. Navy, Formerly Supt. U. S. Naval Observatory

FREDERICK V. COVILLE
Formerly President of Washington Academy of Sciences

JOHN E. PILLSBURY
Rear Admiral U. S. Navy, Formerly Chief Bureau of Navigation

RUDOLPH KAUFFMANN
Managing Editor The Evening Star

T. L. MACDONALD
M. D., F. A. C. S.

S. N. D. NORTH
Formerly Director U. S. Bureau of Census

1917-1919

ALEXANDER GRAHAM BELL
Inventor of the telephone

J. HOWARD GORE
Prof. Emeritus Mathematics, The George Washington University

A. W. GREELY
Arctic Explorer, Major Gen'l U. S. Army

GILBERT H. GROSVENOR
Editor of National Geographic Magazine

GEORGE OTIS SMITH
Director of U. S. Geological Survey

O. H. TITTMANN
Formerly Superintendent of U. S. Coast and Geodetic Survey

HENRY WHITE
Formerly U. S. Ambassador to France, Italy, etc.

JOHN M. WILSON
Brigadier General U. S. Army, Formerly Chief of Engineers

1918-1920

CHARLES J. BELL
President American Security and Trust Company

JOHN JOY EDSON
Chairman of the Board, Washington Loan & Trust Company

DAVID FAIRCHILD
In Charge of Agricultural Explorations, Department of Agriculture

C. HART MERRIAM
Member National Academy of Sciences

O. P. AUSTIN
Statistician

GEORGE R. PUTNAM
Commissioner U. S. Bureau of Lighthouses

GEORGE SHIRAS, 3D
Formerly Member U. S. Congress, Faunal Naturalist, and Wild-Game Photographer

GRANT SQUIRES
New York

To carry out the purpose for which it was founded twenty-eight years ago, namely, "the increase and diffusion of geographic knowledge," the National Geographic Society publishes this Magazine. All receipts from the publication are invested in the Magazine itself or expended directly to promote geographic knowledge and the study of geography. Articles or photographs from members of the Society, or other friends, are desired. For material that the Society can use, adequate remuneration is made. Contributions should be accompanied by an addressed return envelope and postage, and be addressed:

GILBERT H. GROSVENOR, EDITOR

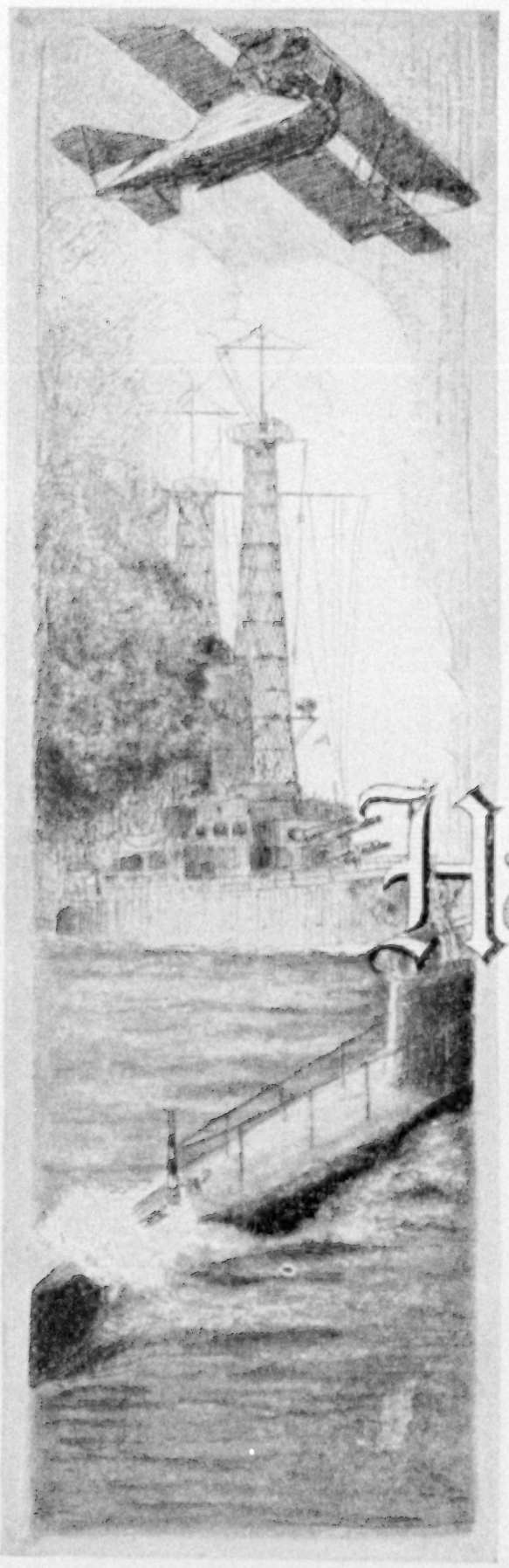
CONTRIBUTING EDITORS

A. W. GREELY
C. HART MERRIAM
O. H. TITTMANN
ROBERT HOLLISTER CHAPMAN
WALTER T. SWINGLE
ALEXANDER GRAHAM BELL
DAVID FAIRCHILD
HUGH M. SMITH
N. H. DARTON
FRANK M. CHAPMAN

Copyright, 1918, by National Geographic Society, Washington, D. C. All rights reserved.

Entered at the Post-Office at Washington, D. C., as Second-Class Mail Matter.

Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of October 3, 1917, authorized July 1, 1918.



Defender of Your Time

Modern artillery defends you against invasion. Frowning dreadnoughts, eager air craft, and sullen submarines weave the modern fabric of the national armor of defense. Are you modern in the watch you carry—in your defense against missed trains, fumbled engagements, and the costly hour-errors and minute-misunderstandings that invade and disrupt your days? One distinguished watch attains the apex of modern proficiency —

Hamilton Watch

"The Watch of Railroad Accuracy"

Modern from design to assembly, and from assembly to service. Keyed to the exacting requirements of modern life. Scientifically safeguarded against error, a Hamilton gives you unequaled accuracy along with reliable, dependable, uninterrupted service. Hamilton is the favorite watch of railroads, and is carried by the engineers of America's most famous fliers

A gallery of 32 quality models to choose from. Prices, $30 to $155; movements, $16 ($18 in Canada) and up. Every Hamilton guaranteed to give absolute satisfaction. Railroad accuracy plus a lifetime of service.

Send Today for "The Timekeeper"
—the story of Hamilton supremacy

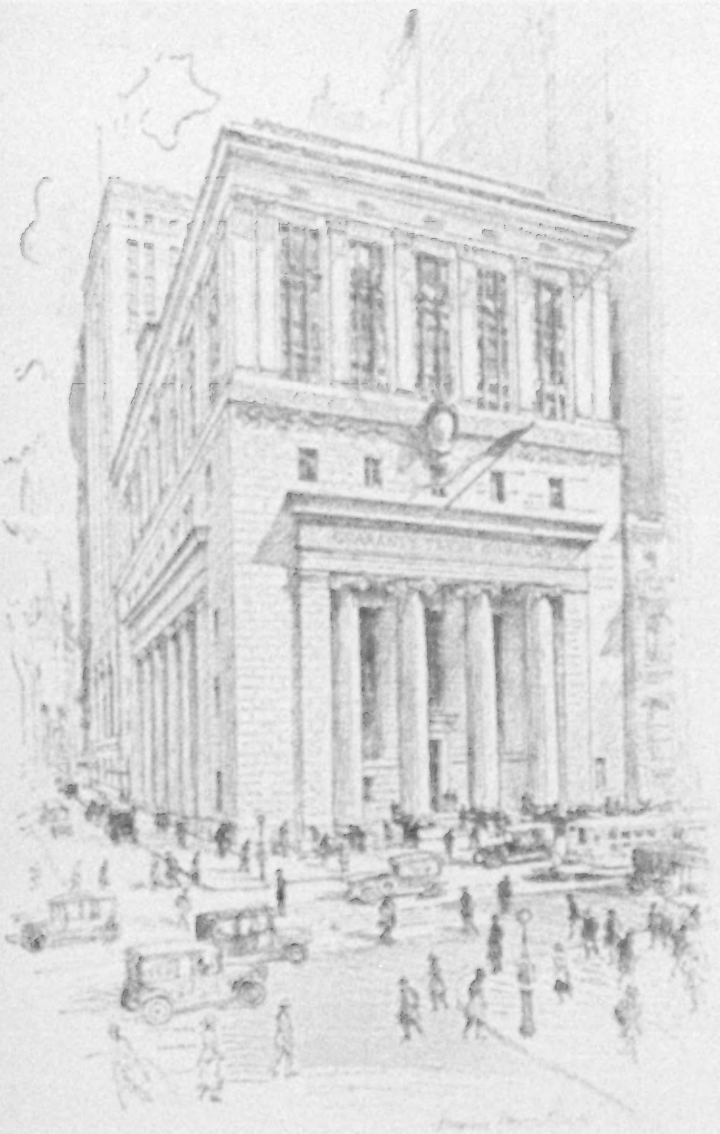
Hamilton Watch Company
Dept. 35 Lancaster, Pennsylvania

XUM

Your Investment Problem

UNDER present conditions sound investment securities are available at prices which yield unusually attractive returns. In solving your investment problem—in placing your funds or in re-investing your holdings to the best advantage—the Bond Department of this Company can be of service to you.

This Department is a complete investment organization, with every modern facility for service to investors. It investigates, examines, and underwrites bond and note issues; buys and sells securities; and furnishes information relating to investments. Through our correspondents in various cities, these facilities are placed at the convenient disposal of our customers outside of New York.



This Company is an organization—of which the Bond Department is a part—covering completely the field of banking and trust service.

Through its Banking Department, the Company transacts a general commercial banking business. As a member of the Federal Reserve System the Company is enabled to extend to its customers the credit facilities and rediscount and collection privileges of a member bank.

Through its Foreign Department and its affiliations and connections throughout the world, the Company affords a complete foreign banking service.

Through its Trust Department the Company acts in every fiduciary capacity for corporations and individuals.

Your inquiries as to how we may serve you will be welcomed.

Our monthly booklet, *Investment Recommendations*, will be sent on request.

Guaranty Trust Company of New York

140 Broadway

FIFTH AVE. OFFICE
Fifth Ave. & 43rd St.

MADISON AVE. OFFICE
Madison Ave. & 60th St.

LONDON OFFICES
32 Lombard St., E. C.
5 Lr. Grosvenor Pl., S. W.

PARIS OFFICE
Rue des Italiens, 1 & 3

TOURS OFFICE
Rue Etienne Pallu, 7

Capital & Surplus $50,000,000 Resources over $600,000,000

"Mention the Geographic—It identifies you."

Tiny Pellets

of Corn Hearts are Steam Exploded—
Puffed to Bubbles, Raindrop Size—
To Make Corn Puffs

There are toasted corn bubbles—called corn puffs—which form the finest of the Puffed Grains, some folks think.

They are airy, flimsy, drop-size globules, with a multiplied toasted corn flavor.

Sweet pellets of hominy are sealed in huge guns; then subjected to fearful heat; then exploded to eight times former size.

The Pellets *The Bubbles*

The object is to blast every food cell, to make digestion easy. But the result is also a food confection—the most delightful product ever made from corn.

For the War-Time Milk Dish

Countless children nowadays get Corn Puffs in their bowls of milk.

They are thin, crisp, flavory morsels, light as air. And never was a corn food so fitted to digest.

Between meals children eat them dry, lightly doused with melted butter.

Keep Corn Puffs with your other Puffed Grains. It's a winsome, wheat-conserving dainty. And, like all Puffed Grains, the blasted food cells make it hygienic food.

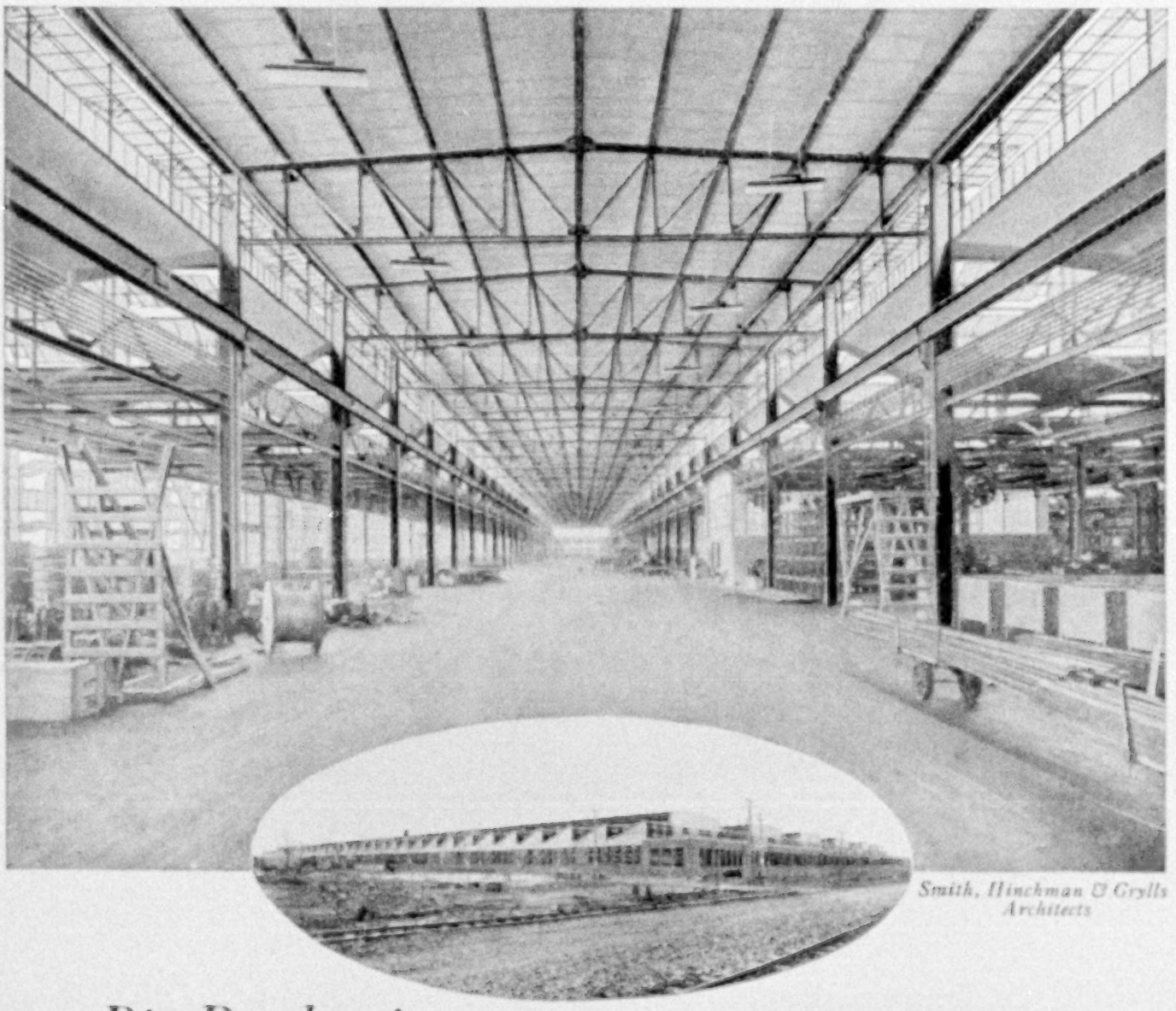
Corn Puffs	Puffed Rice	Puffed Wheat

All Bubble Grains, Each 15c Except in Far West

The Quaker Oats Company

Sole Makers

(1988)



Smith, Hinchman & Grylls Architects

Big Production and accurate manufacture are two prime essentials in Government work. Fenestra Solid Steel Windows aid materially in accomplishing these results by eliminating shadow zones in the enormous new Dodge Brothers Ordnance plant here shown.

To structural durability is added equally durable windows which augment the strength of this plant where the glass area is practically one third that of floor space. There are 134,000 square feet of Fenestrated wall and sawtooth roof, and 500,000 square feet of floor space. 31,775 lineal feet of Fenestra operator open and close the sash as desired. As in other modern manufacturing structures everywhere, the final judgment of the nation's expert engineers approves Fenestra. Daylight, Ventilation, Weathering and Fire Protection are Fenestra values —for the full story address

Detroit Steel Products Company, 4119 E. Grand Blvd., Detroit, Mich.

Fenestra

SOLID STEEL WINDOWS

MARMON 34

Nowhere are Art and Engineering more ideally mated than in the production of Marmon Closed Cars. The long low 34 chassis is exceptionally well suited to the purposes of fine coach work—to comfort, nobility, grace and beauty.

136-Inch Wheelbase
1100 Pounds Lighter

NORDYKE & MARMON COMPANY
Established 1851
Indianapolis

BOYS and mechanics aren't the only ones who have to get rid of obstinate dirt and stains.

If your hands are stained with ink or dye or grease, treat them to a bath in Goblin Soap suds—you'll be delighted.

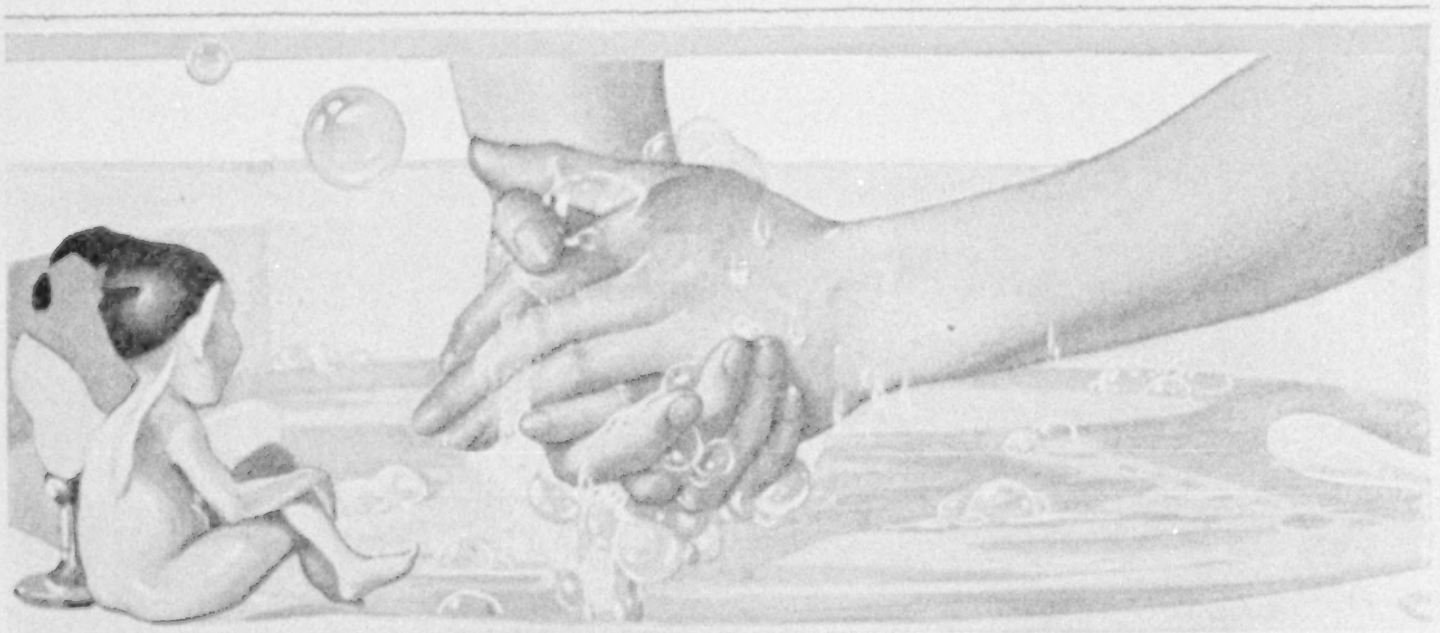
Goblin Soap is a splendid all around soap for toilet, bath, kitchen, garage, shop—anywhere where there is dirt to be removed without injuring the skin. Try it.

It lathers quickly and easily in any water, hard or soft, warm or cold; it's gentle and thorough.

For Toilet or Bath
Large Cake
5c
Price in Canada, 7c

If your dealer does not have Goblin Soap please send us his name and we will see that you are promptly supplied

CUDAHY, 111 W. Monroe St., CHICAGO
64 Macauley Ave., Toronto, Canada



Weed Chains of Solid Gold

—would not be worth as much as Weed Chains of Steel you use on the tires of your passenger car and truck.

Steel is worth more than gold now, for in these days we measure the real value of a metal by the work it does.

Conserve your Weed Chains as you must conserve gasoline.

Use your passenger cars in bad weather only when it is necessary.

Weed Chains must be saved for trucks and essential passenger cars, which should be kept going rain or shine.

When you must use your car put on your chains at the first drop of rain, and take them off the moment the road is safely dry.

Waste through reckless, unnecessary use is now a crime.

If you don't help save Weed Chains, as you are helping to save gasoline, there will be a national shortage.

This means not only a tremendous loss, through injury to cars and trucks, but the checking and curtailing of essential industries to which these cars and trucks are essential.

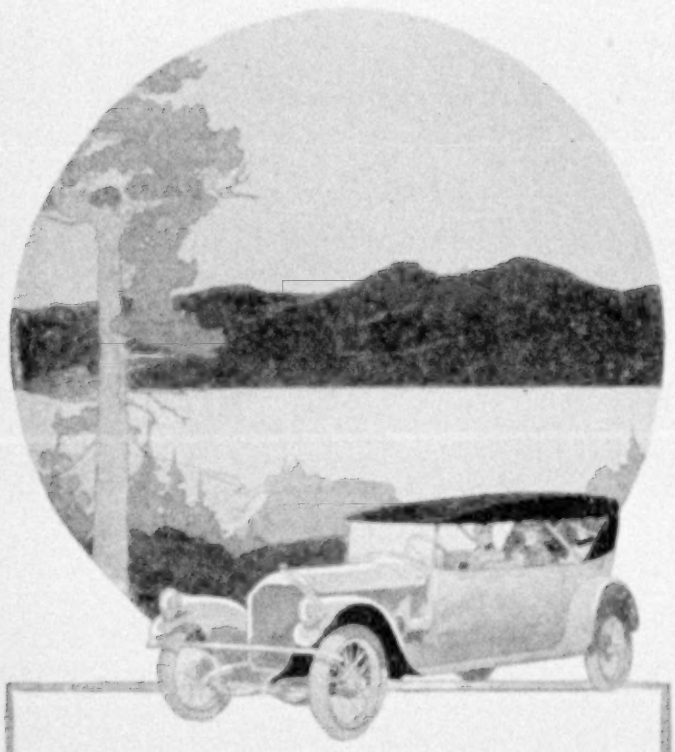
Cars and trucks must have chains on slippery pavements and muddy or snowy roads.

A nation-wide shortage in Weed Chains means the use of makeshifts—a harmless rope, or ruinous non-creeping chains that give a certain amount of traction, but cut the tires to pieces.

Conserve your Weed Chains

AMERICAN CHAIN CO. INC., BRIDGEPORT, CONN.

XUM



Quality, the finest—Price, regardless—
Wearing-power, the longest—that's—

Genuine
Pantasote
Top Material

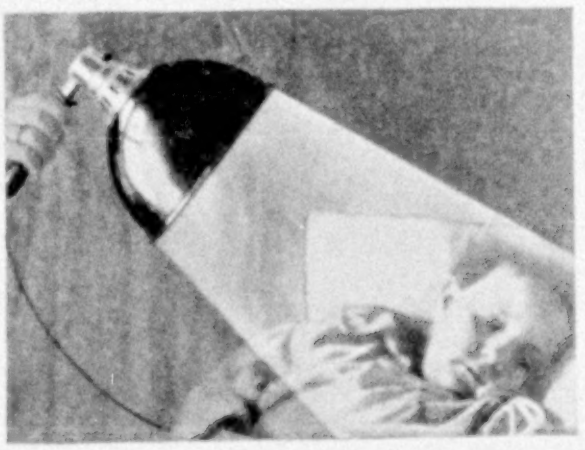
used on cars that bring the highest prices.

Here's proof of the pudding in a nutshell

PIERCE ARROW	LOCOMOBILE	CADILLAC
MARMON	CHANDLER	PREMIER
SCRIPPS BOOTH	WHITE	HUDSON
MERCER	COLE	CHALMERS
COLUMBIA	REO SIX	WESTCOTT

Avoid misrepresentation, even though it be unintentional. Look for this label on tops represented as Pantasote.

The Pantasote Company
1714 Bowling Green Bldg., New York



Relieve Your Pain In Nature's Way

Heat and light naturally ease pain, and with a Thermolite they are available instantly wherever there is electric current. These beneficial rays, safe as sunlight, penetrate the tissues, and by removing congestion, relief from pain follows quickly and naturally. Muscular soreness, stiff neck, rheumatism, neuralgia, congestion—all respond to

Thermolite

SAFE AS SUNLIGHT

There is nothing intricate or harmful in this remarkable treatment, and it's far easier and more effective than application of poultices, hot water, and ordinary methods. But the best way to tell is by actual test so we're willing to send Thermolite on approval. If not satisfied, your money refunded. We do this because we know how enthusiastic a Thermolite user becomes.

Send $7.50 for Thermolite complete. Write for interesting literature that shows how to banish nearly every pain

Also sold by surgical and electrical supply houses

H. G. McFADDIN & CO.
38 Warren St., New York
Makers of Lighting Devices Since 1874

QUALITY - - PERSONAL SERVICE

Our patrons enjoy the advantages of 73 years of value-giving. Request Booklet 3.

HARRISON GRANITE COMPANY
200 Fifth Avenue New York City

Offices in principal cities. Works: Barre, Vt.

Furs

OF SUPERIOR QUALITY
DISTINCTIVE IN STYLE

C. G. Gunther's Sons

391 Fifth Avenue — New York

Furriers exclusively for ninety-eight years

Test Drednaut Yourself

TAKE off that old top and replace with a stunning new one of *Chase Drednaut* and notice the big improvement — a rejuvenated car at small cost.

Ask Your Dealer or Write Us

CHASE
DREDNAUT
Motor
Topping

·L·C·CHASE & CO·
BOSTON
NEW YORK · DETROIT · CHICAGO · SAN FRANCISCO
LEADERS IN MANUFACTURING SINCE 1847

A Lifetime of Beauty

A TOP of *Drednaut* will often outlast the life of the car itself. It adds beauty and dignity—remains true in finish over a long period of severe use.

"Defies Time and the Elements"

The Beauty of RED GUM in Natural Tones

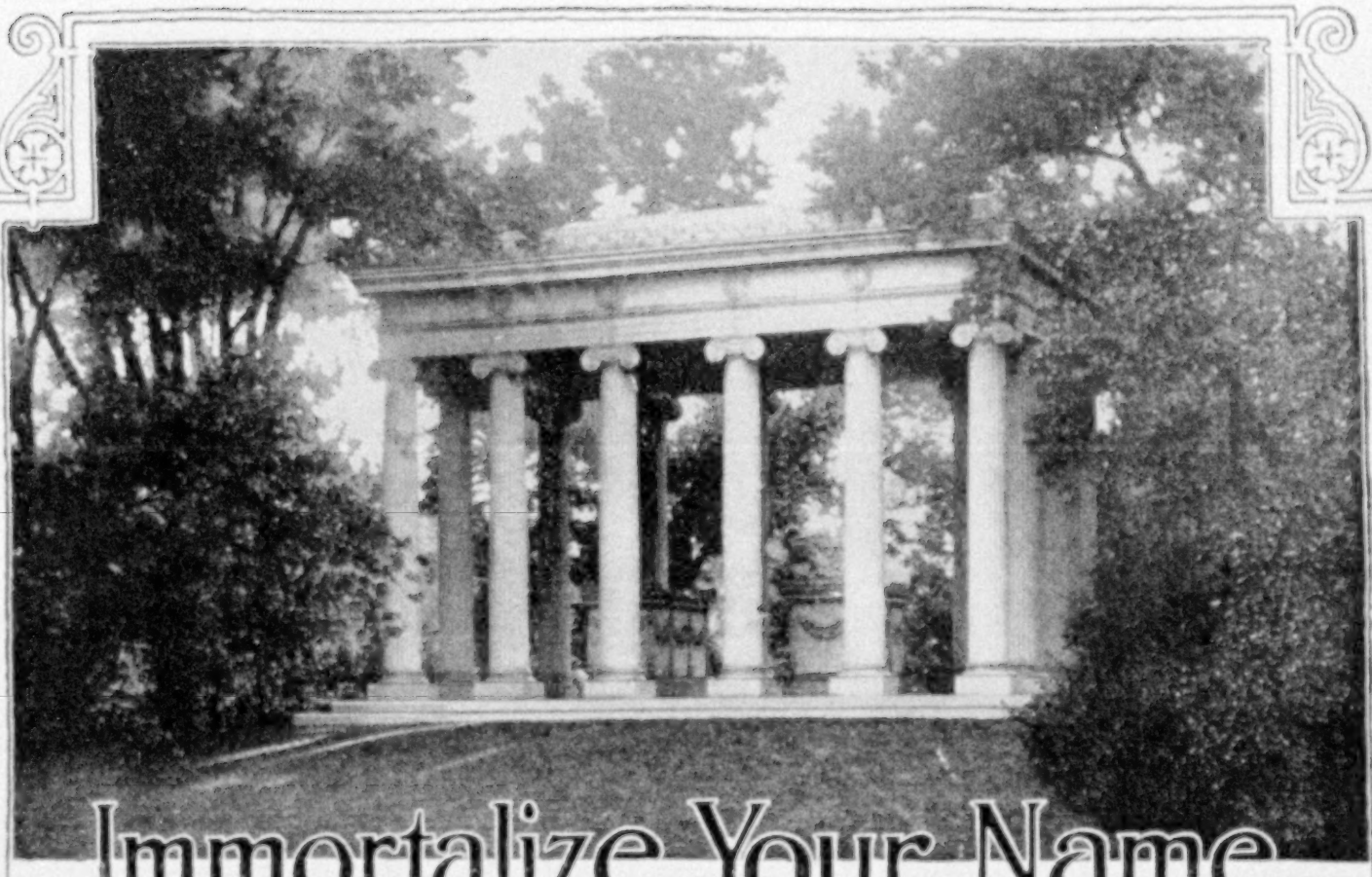
ONLY PARTLY EXPLAINS WHY IT IS "AMERICA'S FINEST CABINET WOOD." IT ALSO "BEHAVES WELL."

EUROPE WAS USING AMERICAN RED GUM FOR FINE CABINET-WORK YEARS BEFORE AMERICA'S PRIDE AWOKE TO ITS OWN.

Residence of C. L. Harrison, Esq., in Cape Girardeau, Missouri. Enjoy Beauty? Write for Samples. Wish Knowledge? Ask for Booklet.

AN ENDURING HARDWOOD, YET SOFT AS SATIN TO THE TOUCH, ITS NATURAL TONE A RICH, WARM BROWN. "A JOY TO THE EYE."

RED GUM DIVISION, AMERICAN HARDWOOD MFRS. ASS'N. 1311 Bank of Commerce Bldg. MEMPHIS, TENN.



Immortalize Your Name In The Rock Everlasting

YOU whose aim is to insure your family against anxiety now and always, should appreciate the value of that memorial which shall honor your name and coming generations. Whether you plan for an impressive architectural effect, a single shaft or a simple marker, nothing will so fittingly perpetuate your memory as the Rock Everlasting

BARRE GRANITE

Sometimes taste will lead to the placing of Barre Granite almost as it was hewn from its native hills, in simple, rugged grandeur. Again it comes in polished columns, in sculptured frieze, in modest slab or marker.

But whatever the type chosen, Barre Granite stands supreme in dignity and beauty and in the quality which resists time and decay.

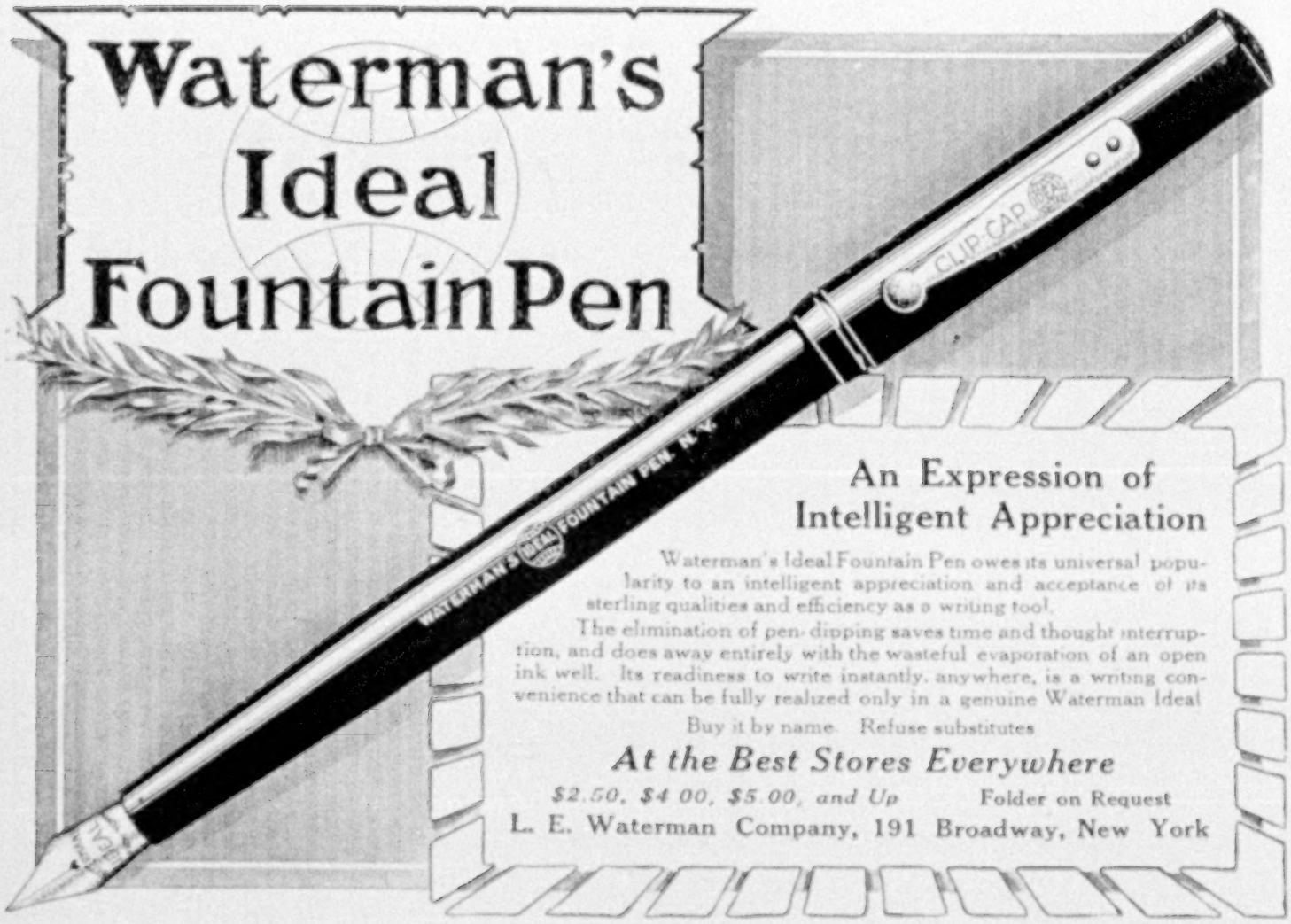
The Rockefeller, Fleischmann, Heinz, Schley, Armour, Tarkington, Potter Palmer, Anheuser, Leland Stanford and thousands of other famous names live in Barre Granite.

The above is the famous Potter Palmer Memorial in Graceland Cemetery, at Chicago.

Write for copy of "Memorial Masterpieces"

BARRE QUARRIERS & MANUFACTURERS ASSOCIATION
Dept. B, Barre, Vermont *"The Granite Center of the World"*

Waterman's Ideal Fountain Pen



An Expression of Intelligent Appreciation

Waterman's Ideal Fountain Pen owes its universal popularity to an intelligent appreciation and acceptance of its sterling qualities and efficiency as a writing tool.

The elimination of pen-dipping saves time and thought interruption, and does away entirely with the wasteful evaporation of an open ink well. Its readiness to write instantly, anywhere, is a writing convenience that can be fully realized only in a genuine Waterman Ideal

Buy it by name. Refuse substitutes

At the Best Stores Everywhere

$2.50, $4.00, $5.00, and Up Folder on Request

L. E. Waterman Company, 191 Broadway, New York

McK&R

Letter from a prominent dentist, whose name will be given on request:

My Rx Is Calox

"I have recently done much work for soldiers and have observed a better condition of the teeth among those who use a good tooth *powder* than with others who use a paste.

My prescription is invariably

CALOX

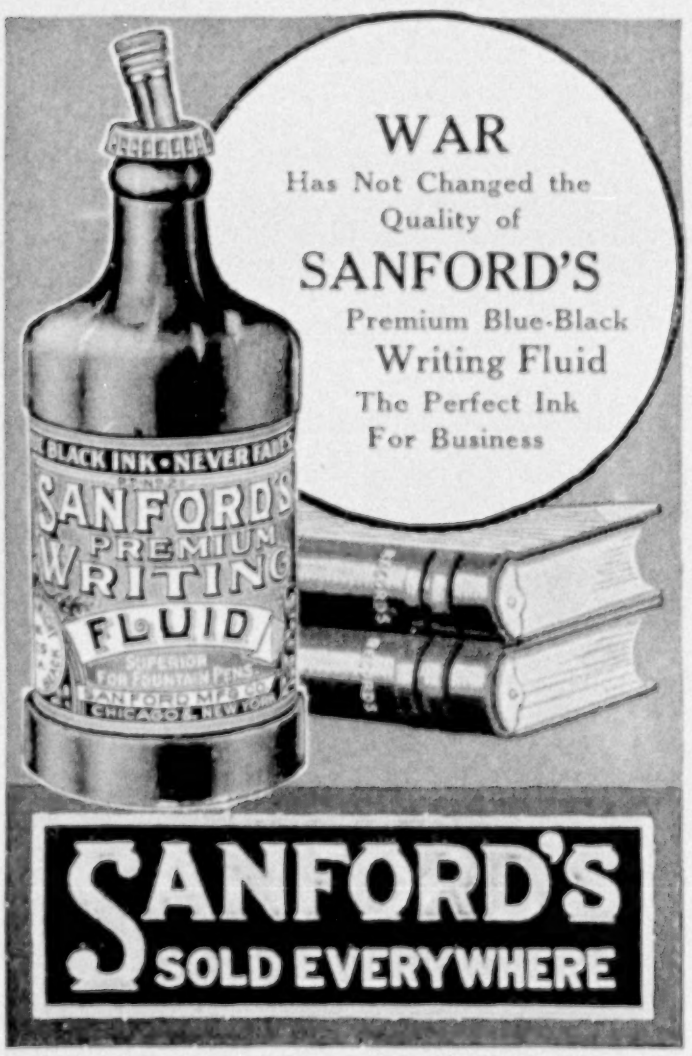
THE OXYGEN TOOTH POWDER"

Send for trial package and interesting booklet on the care of the teeth

McKESSON & ROBBINS

INCORPORATED

88 Fulton Street New York



WAR

Has Not Changed the Quality of

SANFORD'S

Premium Blue-Black Writing Fluid

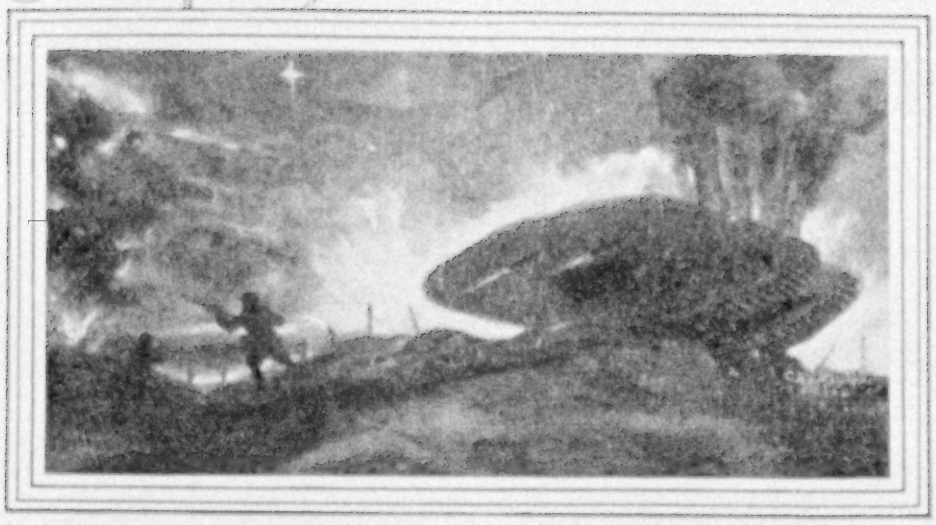
The Perfect Ink For Business

SANFORD'S

SOLD EVERYWHERE

Elgin—

"Guiding Star of the Service"



TONIGHT in No Man's Land! Through all that wild inferno—shrieking shells and spewing shrapnel and stuttering machine guns and clanking, crunching tanks—on the tiniest and cheeriest of mechanisms hangs the destiny of the world.

Never before, in all history's wars, has Time played so appallingly vital a part. The grim significance of "zero hour" has burned this deep into the minds of our boys over there: unless their watches are in step with those of the fire-control, they will be wiped out by their own guns. Desperate, blood bought raids over the top, useless if delivered out of unison, become irresistible when timed to the tick of an Elgin.

Elgins! Guiding stars to our Emergency Fleet—trusted companions of a great Polar explorer—pathfinders for intrepid government scientists—official chronometers of our destroyers and torpedo boats!

Thousands of Elgins are used by the Government in our Navy—tens of thousands by our Signal Corps—and along that surging battle-line in France hundreds of thousands of Elgins are in hourly use by the fighting men of America and her gallant Allies—

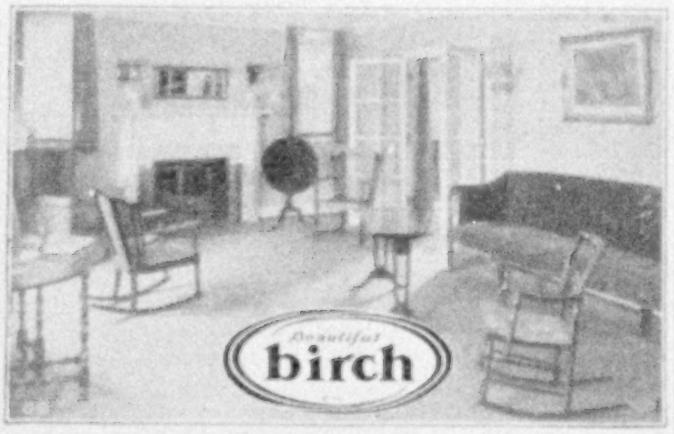
—a war essential of the first rank.

One of the famous Strambra models

ELGIN NATIONAL WATCH CO., ELGIN, U.S.A.

XUM

"Beautiful Birch for Beautiful Woodwork"



Living Room, Oakes Home, Evanston, Ill. White enamel on birch. Messrs. Schmidt, Garden & Martin, Chicago, Arch'ts

You live *inside* your home—

The interior woodwork must be a delight to the eye, harmonious, beautiful and in good taste. ("beautiful **birch**" characteristics).

"Beautiful **birch**" being a close-grained, hard, lasting wood forms an ideal base for white enamel.

It lends itself to a wide variety of finishes from light to dark, "holds its own" under hard usage, is "mar-proof," and above all else—*economical to buy.*

FREE *Six little panels in six handsome finishes with a common sense illustrated book. Write please.*

The NORTHERN HEMLOCK *and* HARDWOOD MANUFACTURERS' ASS'N

214 F. R. A. BUILDING OSHKOSH, WIS.

An Actual Incident in a Los Angeles Hotel

"I Should Worry about Pockets—"

said a sailor boy.

"MY Boston Garters have never failed me yet."

He thus expressed the confidence that every wearer has in the security of the

Boston Garter

You can always rely on them to "stay put." And it's a real pleasure to wear them because they keep your socks smooth and rest so lightly on the leg that you forget you have them on.

At leading stores from coast to coast.

GEORGE FROST CO., MAKERS, BOSTON

"ART IN MEMORIALS"

Beautiful booklet just off the press—illustrating many distinctive and exclusive Memorials.

If expecting to spend $500 or more, write for it. It is intensely interesting.

MEMORIALS ART COMPANY
Representatives in Principal Cities
Studios: 103 Delaware Court, Buffalo, New York

Ultramorial

TRY

SPRATT'S WAR RODNIM No. 1

This has always been a favorite Dog Food of the expert kennel owners and trainers.

SPRATT'S FIBO

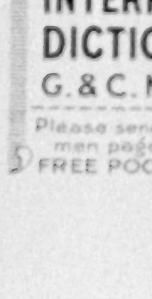
an appetizing and flesh-forming food of unusual merit for puppies and dogs out of condition, for dogs recovering from illness; also for shy or dainty feeders.

Write for samples and send 2-cent stamp for "Dog Culture."

SPRATT'S PATENT, LTD.

Newark, N. J.; San Francisco, Cal.; St. Louis, Mo.; Cleveland, Ohio; Montreal, Canada. Factory also in London, England.

SAVO AIR MOISTENER

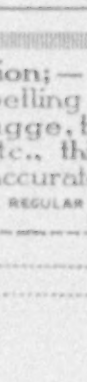


FILL WITH WATER, HANG ON BACK OF ANY RADIATOR OUT OF SIGHT

Converts dry indoor air into a moist, wholesome, healthful atmosphere. Saves *Health, Furniture, Pianos;* also 25% of your coal bills. **Write for Free Booklet.**

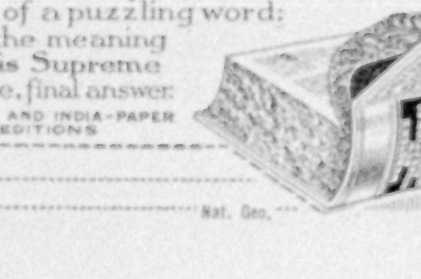
SAVO Manufacturing Company

315 New York Life Building, Dept. G. Chicago, Illinois



SAVO FLOWER AND PLANT BOX

Self-Watering and Sub-Irrigating



The All Year Round Garden

For Windows, Porches and Sun Parlors

Leak-proof and rust-proof. You can move Savo Boxes indoors or out and have beautiful Flowers and Plants the year around. Write for Free Catalog.

SAVO MFG. CO., 315 N. Y. Life Bldg., Dept. D. Chicago, Illinois

---

WEBSTER'S NEW INTERNATIONAL DICTIONARY

Whatever your question;—be it the pronunciation of Cantonment; the spelling of a puzzling word; the location of Zeebrugge, the meaning of blighty, ace, tank, etc., this Supreme Authority contains an accurate, final answer.

G. & C. MERRIAM CO., SPRINGFIELD, MASS. REGULAR AND INDIA-PAPER EDITIONS

Please send me specimen pages and FREE POCKET MAPS { NAME ..... ADDRESS .....

Nat. Geo.

September Investments On Attractive Basis

WE are offering for September investment bonds and short-term notes of a breadth and variety to meet the requirements of all classes of investors.

The securities we offer have been investigated by our buying departments and we recommend them to the consideration of investors.

Securities at present prices afford a liberal yield and we recommend them for investment.

Send for List AN-87

The National City Company

National City Bank Building, New York

Correspondent Offices in 31 Cities

Bonds *Short-Term Notes* *Acceptances*

Buy Liberty Bonds to the Utmost

THE duty of every Americnn soldier is to fight for Liberty.

The duty of every American citizen is to *lend* for Liberty—to buy Liberty bonds and buy to the utmost.

Back up the Boys in France! Buy bonds of the Fourth Liberty Loan to the limit of your ability. Let your subscription equal the full measure of your patriotism!

S.W. STRAUS & CO.

Established 1882 Incorporated

NEW YORK 150 Broadway CHICAGO Straus Building

Detroit Minneapolis San Francisco Philadelphia

36 years without loss to any investor

8%

From Safe Investment

For One, Two or Three Years

Denominations of $100, $500, and $1,000.

Abundant security and ample future earnings assured by long-time contracts.

Company's product is of utmost importance in both peace and war times.

Ownership one of the strongest in the Middle West.

Valuable conversion privilege.

Arrangements already consummated assuring prompt payment at maturity.

Write for Circular No. 1012-D

Peabody, Houghteling & Co.

(ESTABLISHED 1865)

10 South La Salle Street, Chicago

(B-294)

Municipal Bonds Protected

by Municipal Taxes

Exempted

from Federal Taxes

Municipal Bonds yielding from 4½% to 6% in $100, $500 and $1000 denominations. Principal and interest protected by municipal taxation; exempted from Federal Income Tax. Issued by thriving cities—amply secured—readily marketable These bonds are sought by savings banks, insurance companies and other ultra-conservative investors.

We also specialize in all issues of Government Bonds

Send for booklets "Bonds as Safe as our Cities" and "A Nation at War—Its Financial Needs". Address dept. N-7.

William R. Compton Co.

GOVERNMENT AND MUNICIPAL BONDS

"Over a Quarter Century in This Business"

NEW YORK 14 Wall Street

ST. LOUIS 408 Olive Street

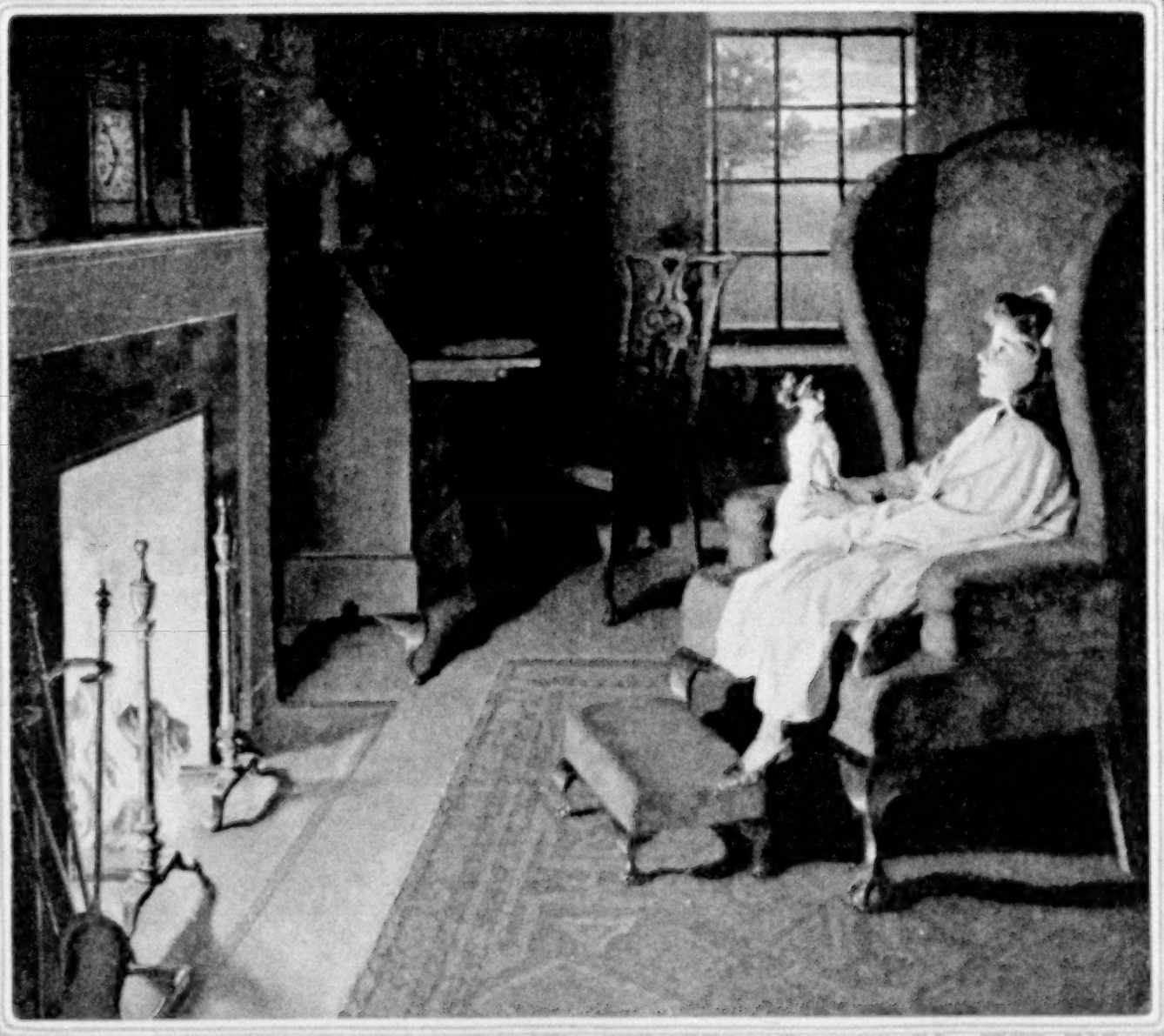
CHICAGO 105 So. LaSalle St.

CINCINNATI 305 Union Trust Bldg.

PITTSBURGH Farmers Bank Bldg.

JACKSON, MISS 506 Millsaps Bldg.

"Mention the Geographic—It identifies you."



COPYRIGHT 1919 BY THE PROCTER & GAMBLE CO. CINCINNATI

"Only a few minutes, Dolly, and my bath will be ready"

THE bathing of a child is the most exacting test for any soap. The tender skin instantly detects the presence of free alkali or any other harsh material.

It is this test multiplied several million fold that proves the mildness, purity and safety of Ivory Soap. Ivory is used in nurseries everywhere because it never has been known to cause the slightest irritation.

To use Ivory Soap is to enjoy a delightful bath and toilet, with the added satisfaction of knowing that nothing in the lather is even remotely injurious to the skin.

IVORY SOAP IVORY IT FLOATS 99 44/100 % PURE

VOL. XXXIV, No. 3 WASHINGTON SEPTEMBER, 1918

THE NATIONAL GEOGRAPHIC MAGAZINE

SHIPS FOR THE SEVEN SEAS

The Story of America's Maritime Needs, Her Capabilities and Her Achievements

BY RALPH A. GRAVES

AUTHOR OF "FEARFUL FAMINES OF THE PAST"

THE human mind cannot conceive of millions; to most of us even tens of thousands convey no concrete idea save that of a numeral and four ciphers. Let this, then, be a story of America's ships and American shipbuilding in the language of units.

Our merchant fleets, already created and those to be, are the great, pulsing arteries supplying our armies abroad with all that constitutes the life-blood of fighting forces—food, clothing, ammunition, machine-guns, artillery, locomotives, airplanes, ambulances, reinforcements!

Ships in sufficiency spell victory. And to make that victory sure the American Government has authorized the United States Shipping Board to expend, as quickly as it can pay men for labor and material, a sum nine times as large as the value of all the gold and silver produced by all the mines of the earth during the year 1916; a sum nearly fifteen times as great as the cost of the Panama Canal; more than seven times as much as the original vast appropriation for our airplane program.

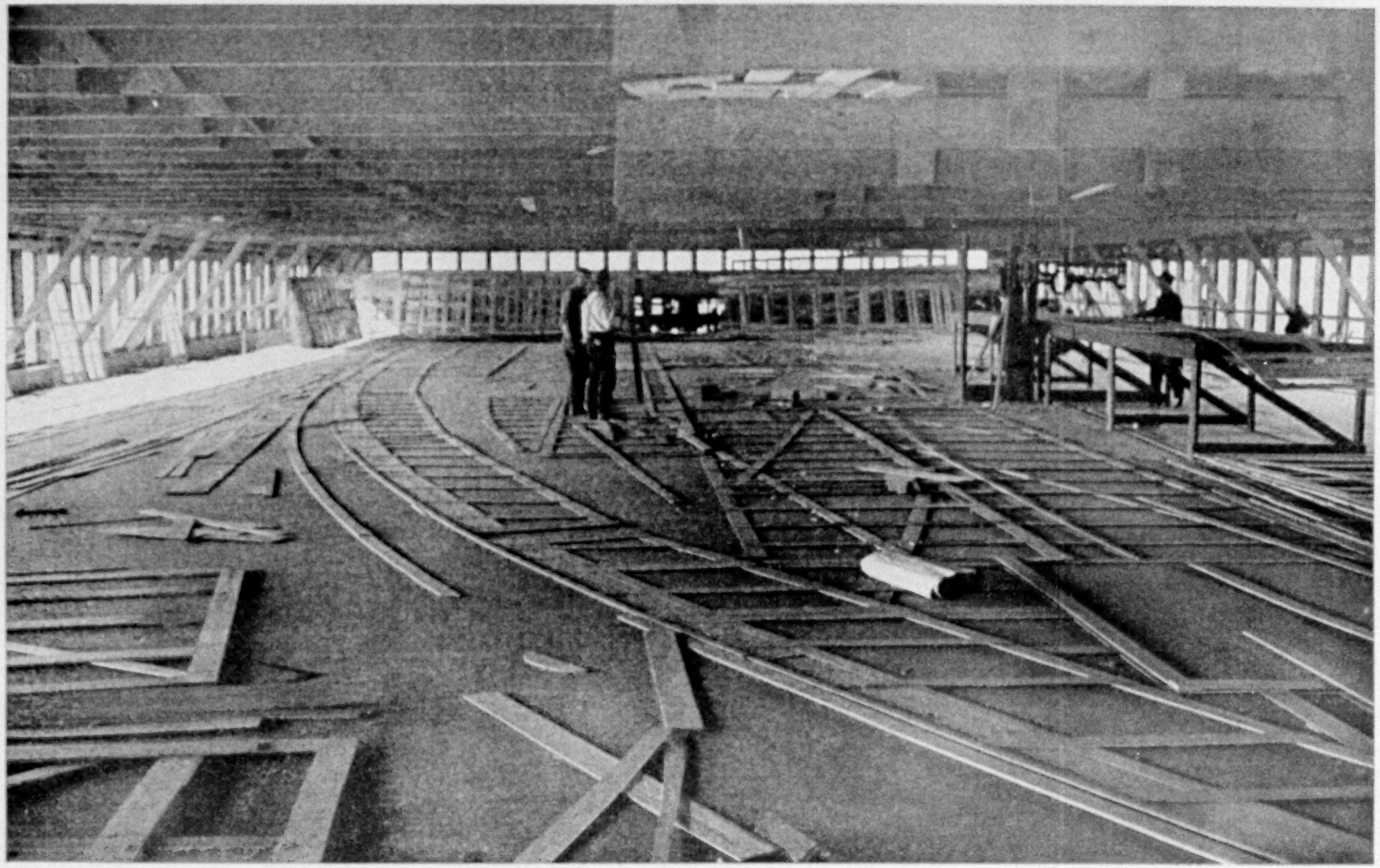
When that sum is exhausted as much more will be placed at the disposal of the Shipping Board, provided the ships are forthcoming in numbers never before built in the same length of time by any nation, or by all the nations of the world combined. Quantity of production, quality of production, and speed of production constitute the supreme aim of the shipbuilding program in the minds of Americans today; the cost is secondary and for subsequent consideration.

THREE TONS PER FIGHTING MAN

Why the quantity and why the haste? The answer lies in the historic fact that two million American soldiers are now in France fighting for the cause of a free world, and in the historic promise that by next July that number will have swelled to four million. *Every individual man of that army requires three tons of shipping to keep him supplied with the essentials of life and of effective warfare.* Not three tons of supplies, but three tons of shipping plying constantly back and forth across the Atlantic, month in and month out, through calm and storm, autumn, winter, spring, and summer. Every soldier—be he in base camp far behind the lines, in aviation training camp, in port of debarkation, in labor battalion, or among the shock troops of the front line—requires that three tons of shipping be set aside, consecrated to his particular needs.

Four million men in France, twelve million tons of shipping on the Atlantic—

XUM



WHERE THE WOODEN TEMPLATES OF A SHIP ARE MADE

A vast, well-lighted loft with a generous expanse of unobstructed floor space is required for the men who make the patterns by which the plates of a fabricated ship are cut, bent, and molded. Great care must be taken to prevent these patterns from swelling or shrinking, as the least deviation in the dimensions of the plates or in the position of the rivet holes means extra labor and consequent delay on the shipways.

the ratio is inexorable. The elimination of a single ton from that irreducible minimum will mean that some fighting man must go without the requisite clothing, food, medical supplies, or munitions of war that would make him 100 per cent effective against the Hun.

Nor is this ratio of three tons to one man a liberal estimate. At the beginning of the conflict the number of ship tons required for each man was as high as five or six—about the same ratio which Great Britain found necessary to keep her army of occupation on the arid Gallipoli Peninsula, where water as well as food and munitions had to be brought by ship. It is only through the genius of organization, of rapidly developing and developed efficiency in the handling of cargoes, both in our own loading ports and in French ports of discharge, and in the hurry-hurry-hurry impulse which actuates the master and crew of every ship at sea flying the American flag, that the tonnage per man has been reduced.

This ratio applies only to our men on the western front. If any considerable number of troops is dispatched to Russia or Siberia, the ratio of ship tonnage per man unit of those forces will rise to six, for the voyage from San Francisco to Vladivostok is twice as long, and two ships making eight round trips a year can carry no larger quantity of supplies than one ship making sixteen round-trip voyages. Of course, much of the foodstuffs required by our Siberian forces would be supplied from Australia, from the Philippines, and in some measure from Hawaii. Japan will be more or less busy keeping her own troops supplied, especially as she has already greatly depleted her shipping resources by charter to the United States.

SHIPS FOR THOSE AT HOME

When we have supplied the vital needs of our uniformed forces, there are the people at home to be provided for—the great army of a hundred million men, women, and children engaged in the essential industries, occupations, and pursuits of a nation at war. They, as well as the soldiers, must be supplied with the raw products of many climes—sugar and coffee and rubber from the tropics; nitrates, pyrites, manganese, sulphur, and other substances which go into the manufacture of war's engines of destruction; hides and wool, hemp and sisal, oil, meats and wheat to supplement our own stocks depleted by export to our Allies. All these and a countless number of other articles of food, clothing, and industry must come to us in ships. Ships! *Ships!* SHIPS!

How, then, is the United States Shipping Board, together with its great auxiliary agencies—the Emergency Fleet Corporation, the Merchant Marine Recruiting Service, and the Port and Harbor Facilities Commission—supplying the nation's needs in the hour of its extremity?

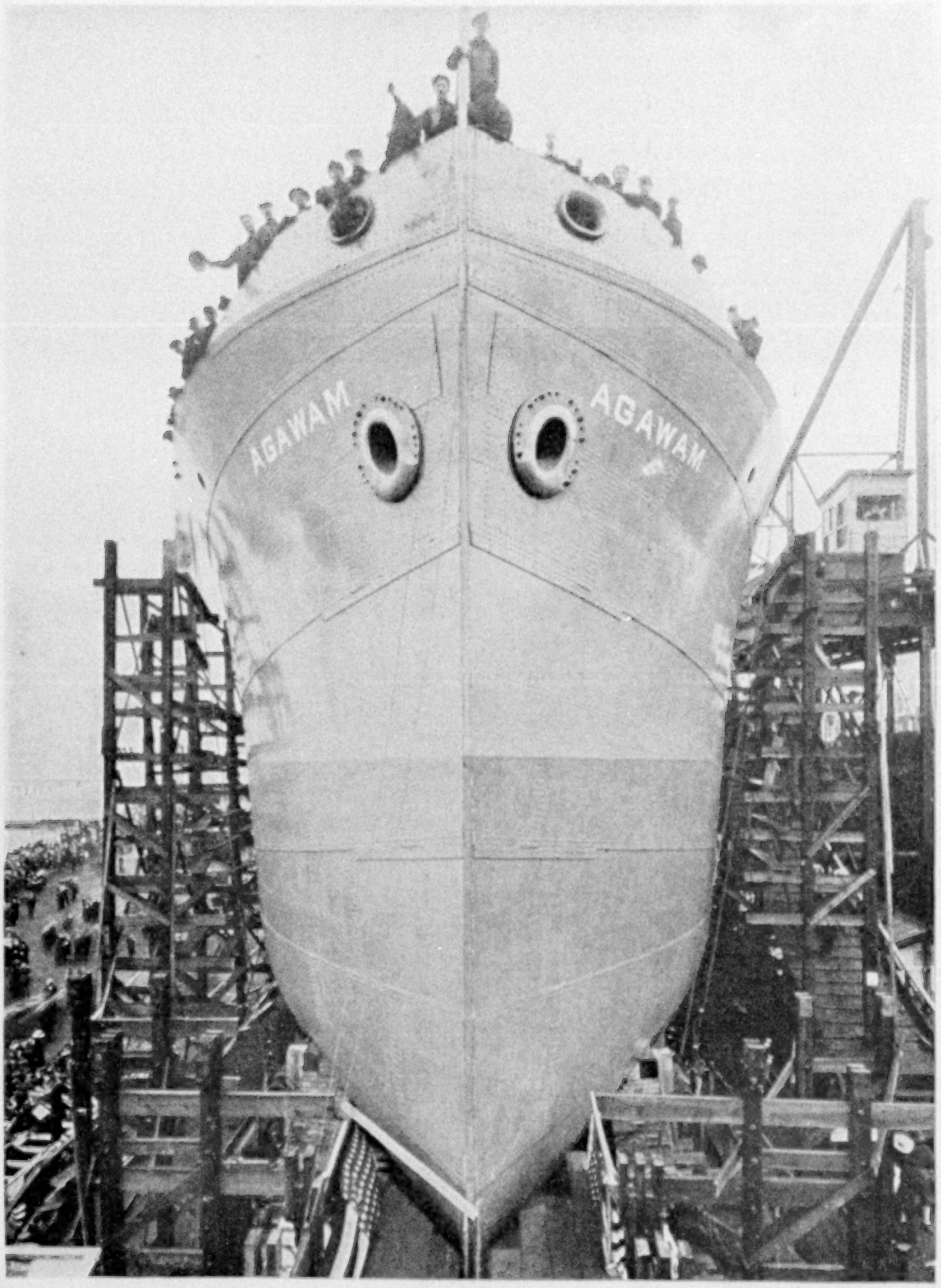
The undertaking, beginning a little more than a year ago in abortive effort, misdirected energy, and chaotic confusion, which seems to be a natural law when any really great program is launched, has gradually evolved into order. The horizon of the immediate future is aglow with the promise of notable achievement.

THE INTRICACY OF SHIPBUILDING

In view of the speed which at last is being attained in the quantity production of ships, it is an excusable error on the part of the layman to assume that the construction of sea-going craft is a comparatively simple undertaking. As a matter of fact, most of us, when the imperative need for a vast American merchant fleet was suddenly realized eighteen months ago, looked upon ship-building with about the same nonchalance as the would-be airplane manufacturer who, in in the early days of the war, sought a contract from the government, declaring that he needed no special equipment for the undertaking, as he could "whittle a flying machine out of a piece of timber with a drawing-knife." Many people still imagine that a ship of wood, steel, or concrete is little more than a glorified row-boat.

In reality, the making of a ship is one of the most intricate achievements of industrial science, requiring the greatest nicety of calculation, workmanship, and correlation of parts. To cite a typical instance: So delicate must be the adjustment of machinery to hull that the shaft line (the location of the shaft which

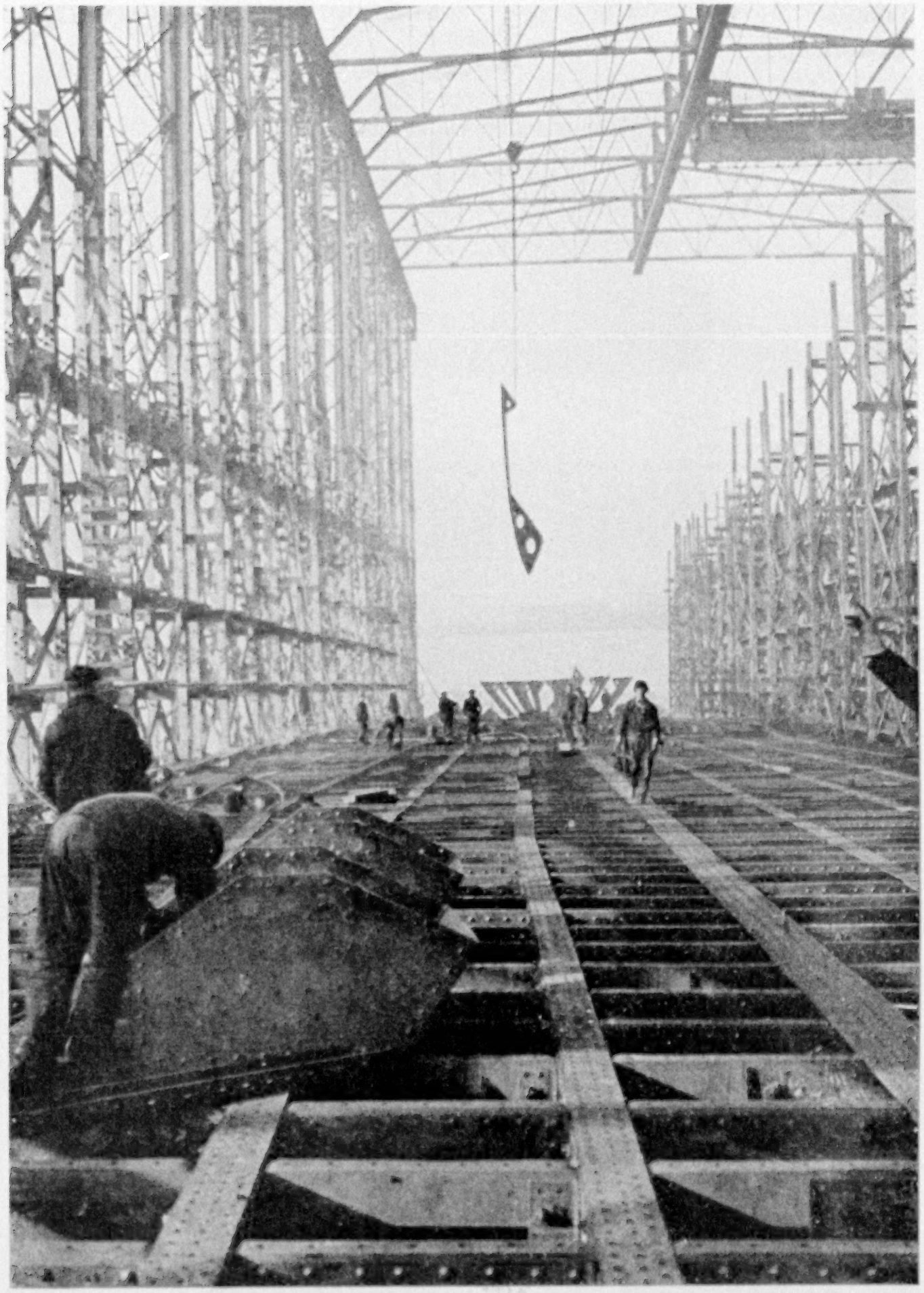
XUM



Photograph by M. Rosenfeld

THE FIRST FABRICATED SHIP EVER BUILT

With the launching of the *Agawam* at the Submarine Boat Corporation's fabricating plant near Newark, N. J., on May 30, there was inaugurated a new shipbuilding method which promises to revolutionize ship construction for all time. Fulton's steamboat, the *Clermont*, on the Hudson; the *Savannah*, the world's first transatlantic steamship; the *Merrimac* and the *Monitor*, first ironclads—all were milestones in maritime history. And now comes the fabricated ship, also "invented and made in America."

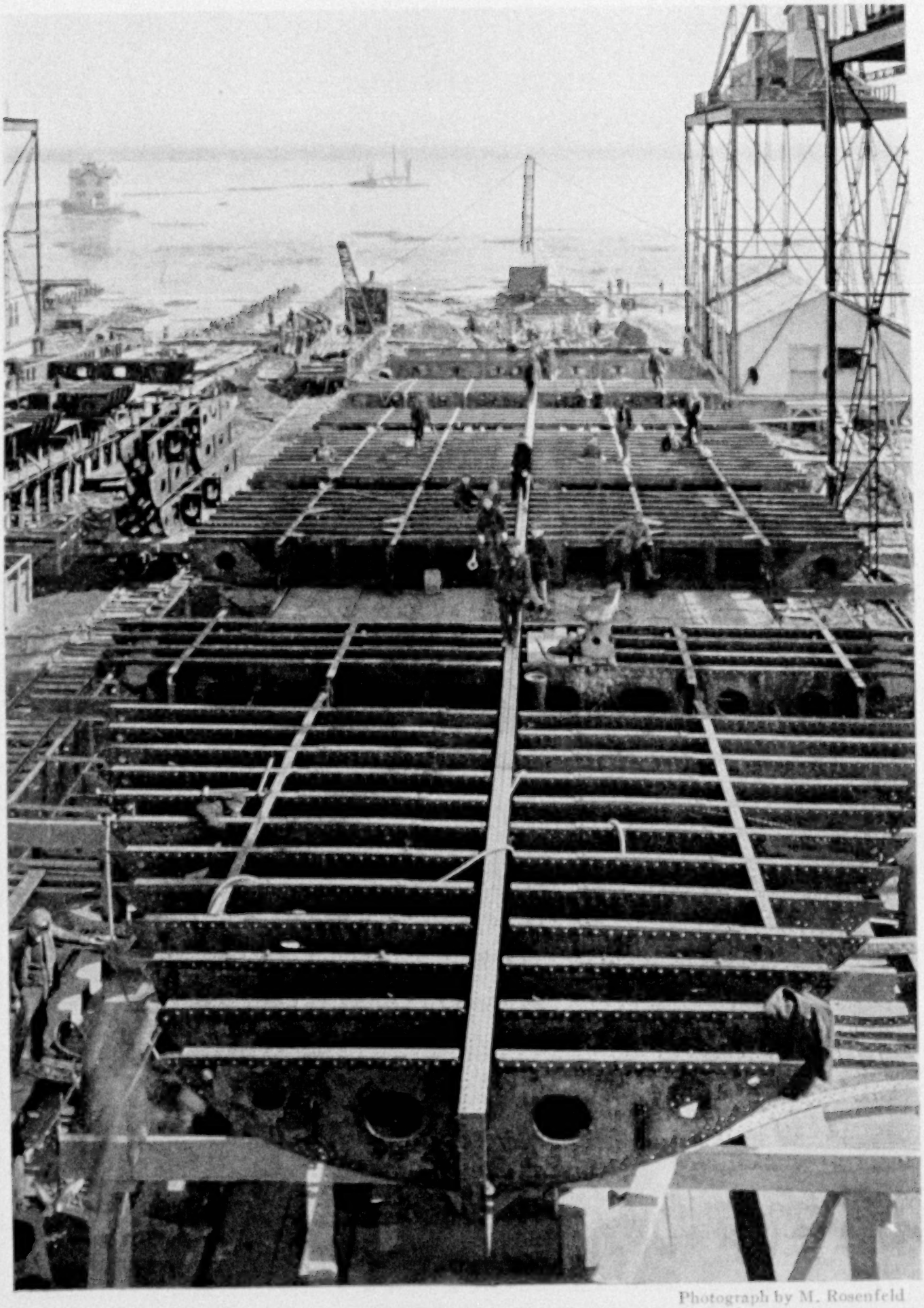


© Committee on Public Information

THE BEGINNING OF A CARGO-CARRIER

The keel having been laid, the keel plates and ribs are hoisted into position by the erectors who operate giant cranes. Much of the assembling work is done in the steel mills, where the plates and parts of the frame are made. In the left foreground are other assembled parts ready to be hoisted into position and riveted.

XUM



Photograph by M. Rosenfeld

HOW A DOUBLE-BOTTOM CARGO SHIP LOOKS IN THE COURSE OF CONSTRUCTION

Note the pile of bulkheads at the left assembled and riveted ready to be hoisted into place

transmits the power from the engine to the propeller) must be run (its position fixed) between 11 o'clock in the morning and 2 o'clock in the afternoon; otherwise the expansion of the metal caused by the heat of the sun's rays shining on one side of the vessel more than the other would deflect the line from the correct position, resulting in disaster to the machinery on the trial trip.

THE FABRICATED SHIP

The widely heralded fabricated steel ship has been the source of much popular confusion. It is generally assumed that the steel plates are cut to a pattern by the hundreds, like the parts of ready-made clothing. After a fashion, this is true, for scores of steel mills and machine shops and 1,000 auxiliary plants, scattered throughout the country and employing a million men, are manufacturing the parts which go to make up our standardized fabricated steel ships, including their engines and boilers. But this does not mean that the thousands of parts which go to make up each vessel can be transported to the seacoast, fitted to pattern like a jig-saw puzzle, pinned together with a few rivets, and pushed out into deep water, a completed cargo-carrier.

The intricacy of "putting together" a fabricated steel ship cannot be more forcefully suggested than to review the groups of men employed in the undertaking.

The erectors and their helpers, with the aid of steam cranes, swing the massive keel, plates, and beams in place. The riveters, with their gangs—the men who heat the rivets to the exact temperature required, the men who pass these rivets from the forges to the riveters lying prone upon their backs between the inner and outer "skin" of the ship, or perched high upon a scaffold at bow or stern, and the "buckers-up" (those who with hammer or counter pneumatic machine press down upon and brad the glowing steel pins which the riveters drive into place with their rivet-guns, striking more than a thousand 95-pound blows to the minute)—bind the plates together. It is the riveter's responsibility if the hull is not watertight or if his rivets are unable to resist the constant buffet of waves and the throb of mighty engines urging the laden craft through heavy seas.

The task of the drillers and reamers is to alter the holes in the plates when they fail to match. Even the tailor-made suit needs a touch here and a stitch there at the first try-on, so it is not to be wondered at that the parts of a steel ship, made in many sections of the country, out of material which is seldom uniform, and under varying conditions of temperature, do not always fit. Where the holes are uneven they are made perfectly cylindrical by reaming, in order that the rivets may completely fill the space and thus avoid both a dangerous play of parts and subsequent leakage.

With both hand and pneumatic tools, the busy chippers trim off and smooth the edges of plates and castings, and when this work is done the calkers turn their attention to the edges of plates, angles, and rivet heads. Water must be kept out not only because of the immediate danger of ruining the cargo and sinking the ship, but also to avoid the insidious danger of small leaks that corrode the metal and in time cause serious structural weakness.

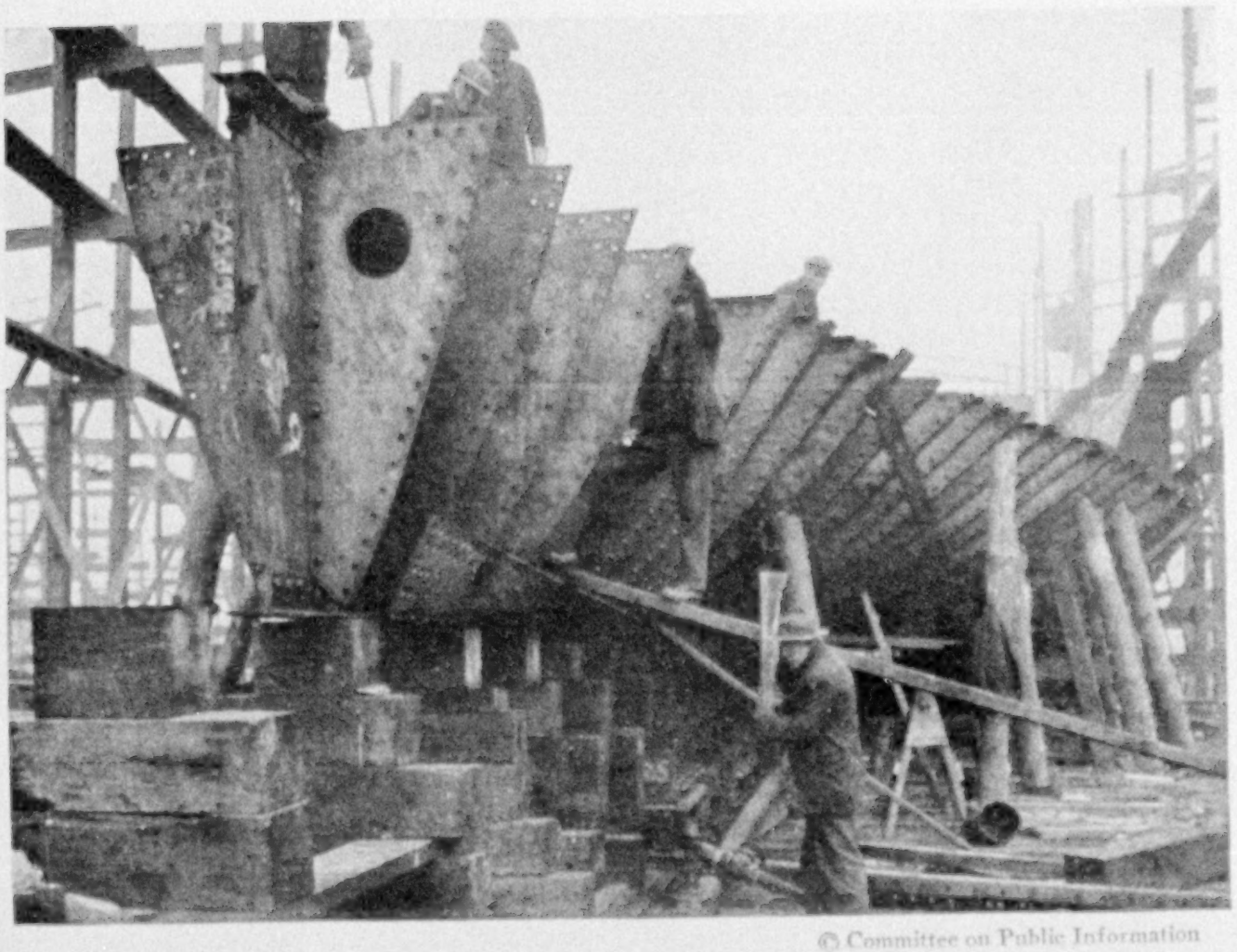
When the metal workers have completed their tasks the shipwrights install the wood decks, the wood foundations for capstans, winches, guns, and other parts. Theirs is the responsibility also for wooden masts, cargo booms and spars, and for launching ways. To joiners is intrusted the interior woodwork and state-room fittings.

Shrouds, stays, lifts, bracings for masts and funnels, life-lines, and all other wire and hemp rope rigging are installed by the "human flies" of the shipbuilding profession—the riggers.

Besides these experts employed on the ships themselves, there is a hurrying group of machine shop and foundry men — sheet-metal workers, plumbers, machinists, blacksmiths, drop forgers, electricians, and acetylene burners.

THE ARISTOCRATS OF LABOR

The coppersmiths deserve a paragraph to themselves, for they are among the aristocracy, the "400" of labor. Their number in America has been variously estimated at from 1,200 to 1,800. At the



© Committee on Public Information

KEEL PLATES OF A STEEL MERCHANT SHIP: THE VERTEBRÆ OF ONE OF OUR CARGO-CARRIERS

The need for hurrying our shipbuilding program is being emphasized daily from scores of quarters. Not only must our growing armies in France be supplied, but we must continue to help feed our stalwart Allies. The Federal Food Administration announced recently that its shipment of foodstuffs to Europe during 1918 will total 10,000,000 tons, but that in 1919 this amount must be increased to 15,000,000 tons.

outbreak of the war many of them were engaged in making copper kettles and worms for breweries, alcohol stills, and turpentine plants. A large percentage of the brewery coppersmiths were either Germans or Austrians, and therefore could not with safety be employed in our shipyards; but the really American artisans were quickly mobilized for the essential labor of hammering out the copper kettles for our new ships' galleys, of rolling from sheet metal the vitally necessary copper pipes for all the parts of a ship's machinery that come in contact with salt water; then of installing those pipes. Working at forced-draft speed, for which they are paid from 85 cents to $1.50 an hour, two coppersmiths become pacemakers for 1,000 men working on other parts of a ship.

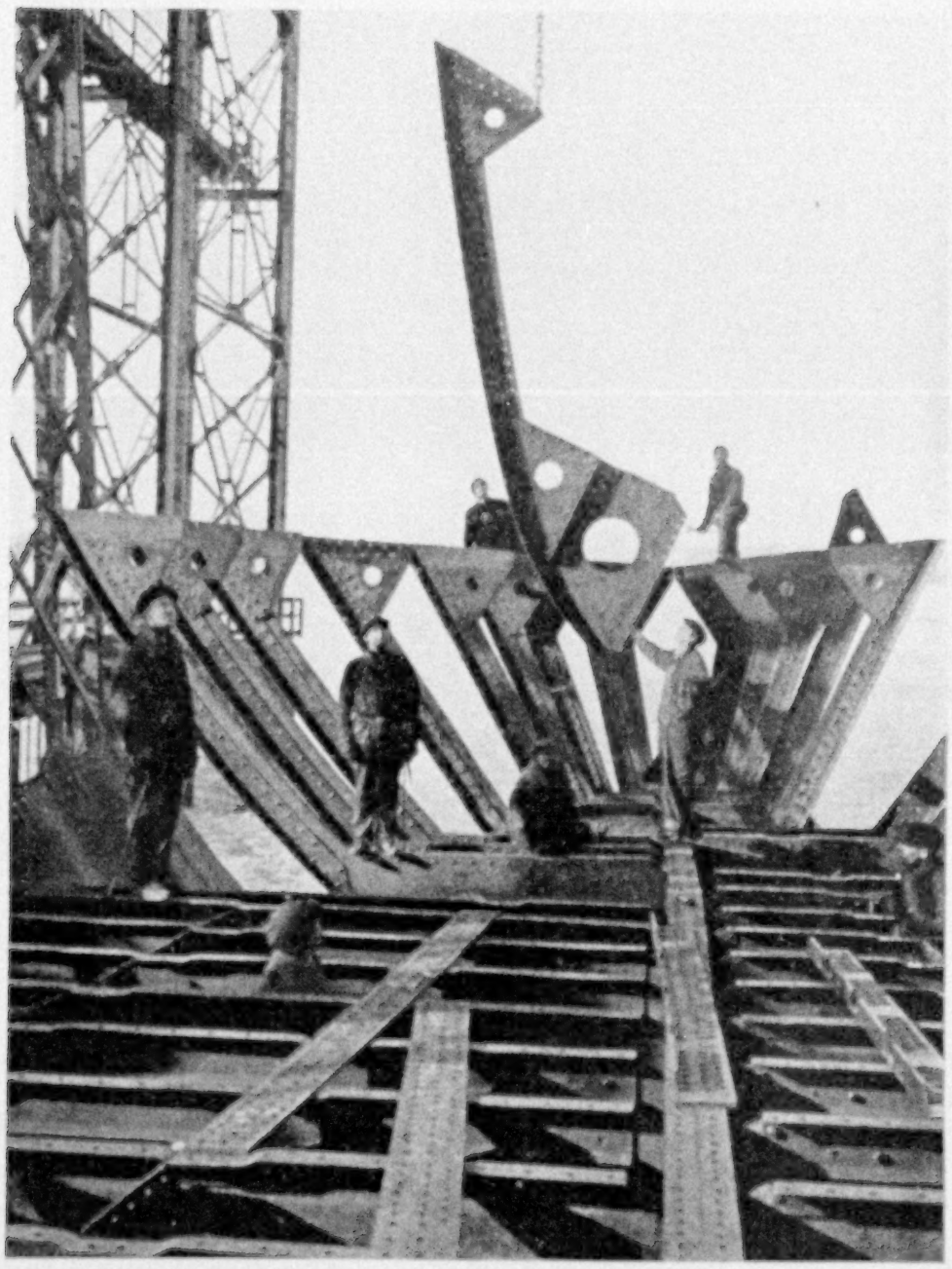
Before the steel plates of a ship can be rolled to varying thicknesses and cut to certain dimensions, be that ship fabricated or specially built throughout, two groups of artisans of great skill and long training must pave the way. These are the loftsmen and the shipfitters.

The labors of the loftsmen are of primary importance. To them come the plans of the ship designer, drawn to a small scale. It is the loftsmen's duty to translate those drawings into terms of a full-size ship.

These experts work in a great mold loft, ideally lighted and provided with a vast expanse of smooth flooring, suggesting a gigantic, low-ceilinged, rough-raftered dancing pavilion. Each plate of the future ship is represented in the molding loft by a template—a light wooden or

paper pattern, on which every rivet hole is marked, every curve and twist designated. With these templates for guidance, the various parts of the ship's hull are laid off, sheared, punched, planed, and bent. Upon the skill and thoroughness of the loftsmen depend in very great measure the speed with which a ship is built, the strength of its hull, and the economy of its construction.

Working in collaboration with the loftsmen are the shipfitters, who take the templates and mark off upon the steel plates the different parts of the hull. In some special instances the shipfitter works directly from his blue-prints without the aid of templates.



© Committee on Public Information

BUILDING THE STERN OF A MODERN SHIP

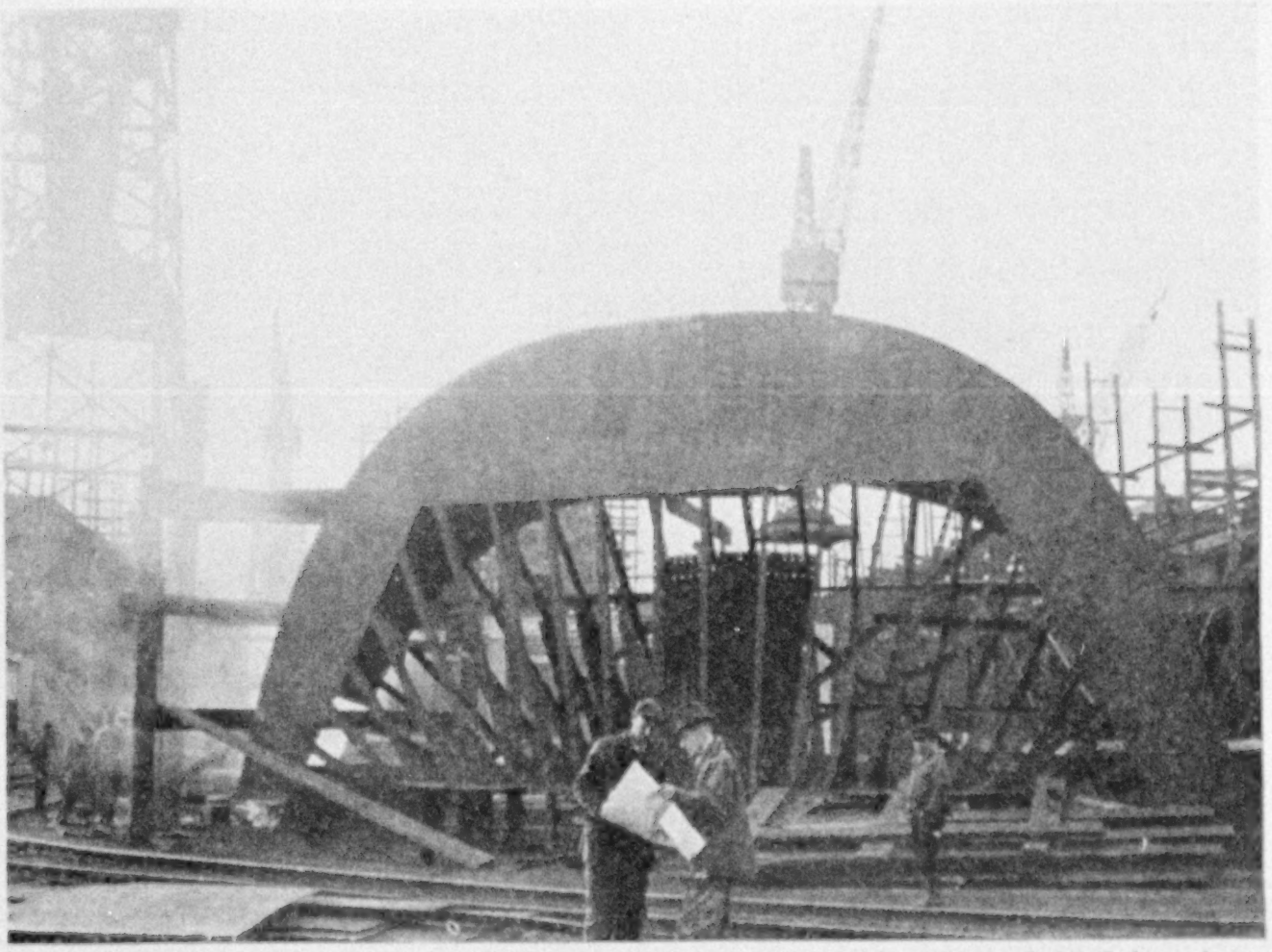
When America suddenly awoke to the necessity of having ships in a hurry, it was the bridge-builders and those who had erected our steel skyscrapers, who proved to be the "men of the hour." The fabricated steel ship is an adaptation of the American bridge-builders' method of construction.

THE CAMOUFLEUR ARRIVES

Once the ship is completed, 60 per cent of the labor being represented in the hull and 40 per cent in the installation of the mechanical parts and the motive power, there comes upon the scene a corps of men whose profession was unknown before the war and for whom a name had to be invented by the French—camoufleurs, men who practice the art of concealment by protective coloration.

In the use of camouflage it has been found impossible so to blend a ship with horizon or seascape as to make it invisible; a phase of the art had to be developed which would effect an optical illusion confusing to the enemy observer.

Marine camouflage, instead of being a new art, is in reality the revival of a practice familiar to the Greeks and Romans at the dawn of the Christian era. They employed what today in modified and improved form is known as the "baffle" system of painting. It is the use of big splotches of color and wide bands of paint to distort the dimensions and shape of vessels to such an extent that an enemy at any considerable distance is unable to determine their size, their armament, or the direction in which they are going.



© Committee on Public Information

THE BULKHEAD OF A FABRICATED SHIP SEPARATELY ASSEMBLED AND READY TO BE SWUNG INTO PLACE BY A STEEL CRANE

At the present rate of progress, it is predicted by officials of the Shipping Board that the normal tonnage of the world will be restored in the fall of 1922. But the requirements of the world after the war will be greater than ever before.

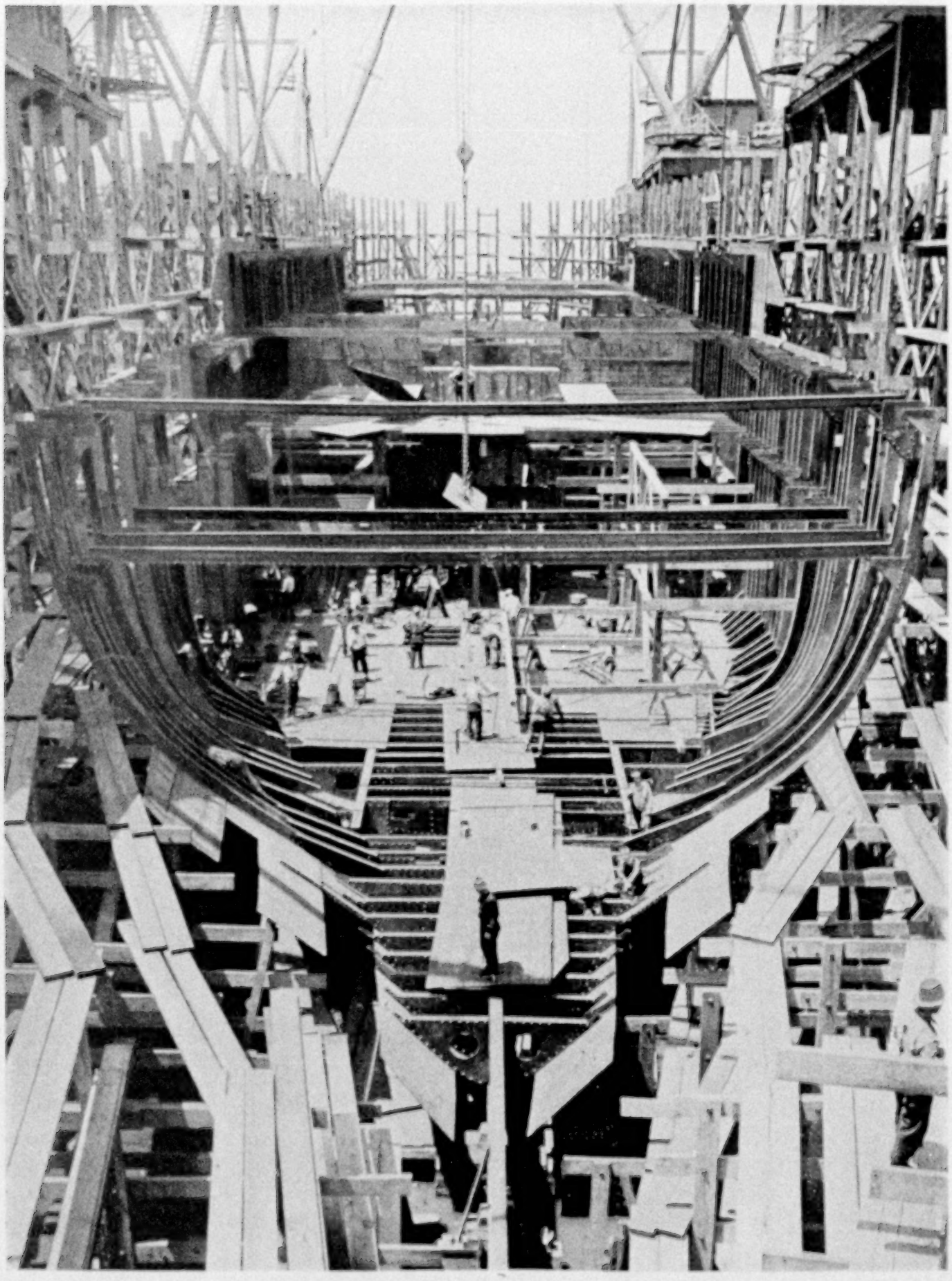
Credit for the adaptation of this ancient illusion method to modern needs is given to Lieutenant Commander Norman Wilkinson, R. N. V. R., a famous British marine artist. It is his "baffle" system which is employed on practically all the ships of the Allies, with modifications to meet the requirements of each type of vessel.

The work of camouflaging has been perfected to such nicety that a ship can be decorated with its particular pattern of streaks and stripes with astonishing dispatch. It is a matter of record that at one American port an 8,800-ton freighter was completely camouflaged in less than 24 hours. The district camouflæur was notified late Saturday afternoon that the vessel in question would be ready to sail Monday morning. By midnight Saturday the design for the ship had been selected and the pattern indicated on the hull and superstructure. With the arrival of necessary supplies at that hour, 62 painters were set to work and by 5.30 Sunday afternoon the ship was ready to defy the most keen-sighted commander of a Prussian U-boat.

THE RIVETER A POPULAR HERO

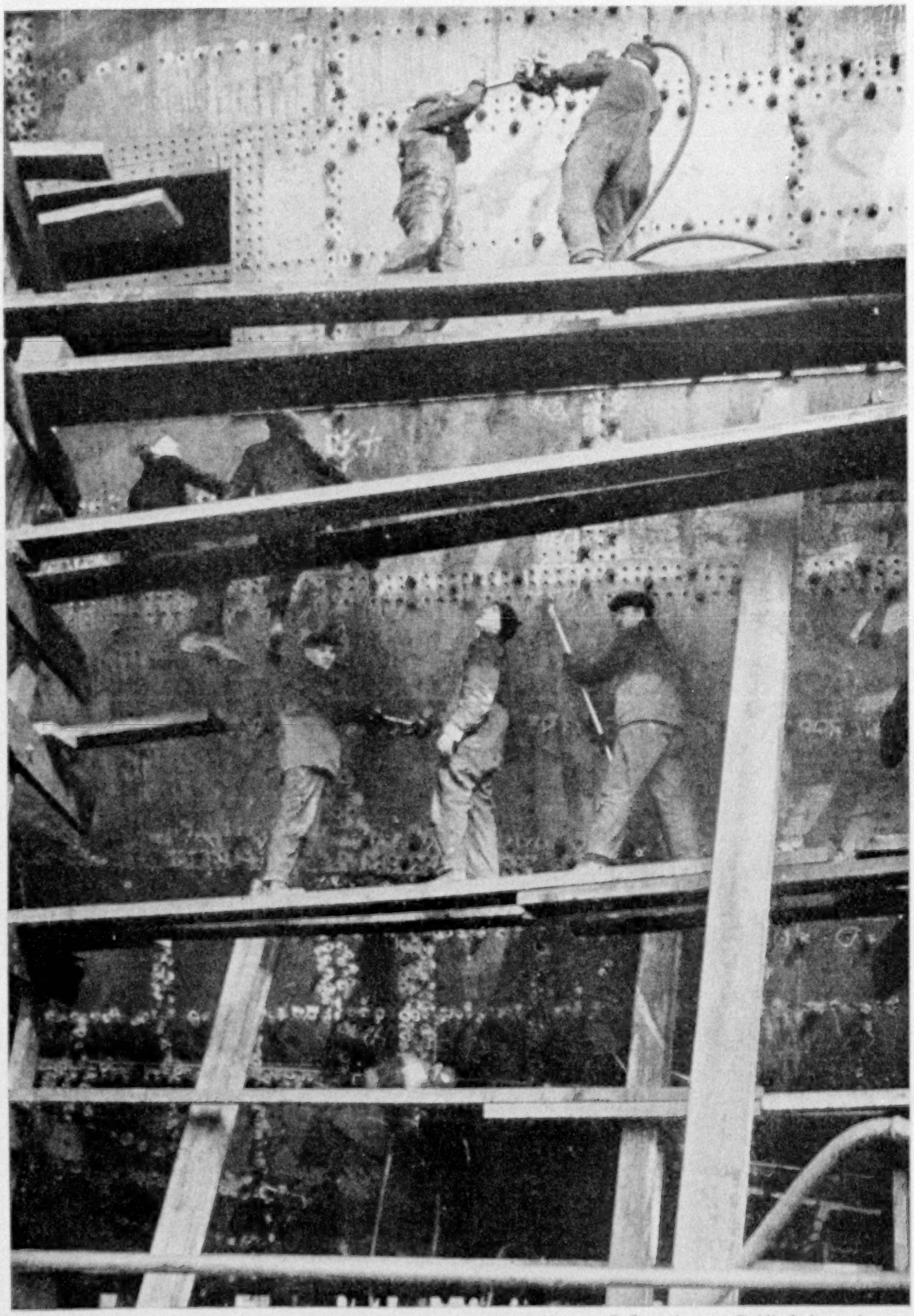
Of all the groups of workers engaged in shipbuilding none has succeeded in focusing public interest upon his particular task so much as has the riveter. The machine-gun staccato of his pneumatic hammer has come to be recognized as the magic song of the shipyards—a national anthem of industry.

The speed with which he sends his steel pins, heated to an orange hue, into place is taken as a criterion of the mettle and efficiency of the particular plant in which he is engaged. The b-r-r-r-ratttt of the rivet gun is the mechanical equivalent of



THE SKELETON OF A STEEL SHIP

To keep the shipbuilders supplied with material, steel mills are working night and day in many sections of the country. During the month of July the Bethlehem Steel Company's plant at Reading, Pa., produced an average of a million rivets a day—enough for two steel ships every 24 hours. It requires 125 tons of metal for each day's rivet output at this plant.



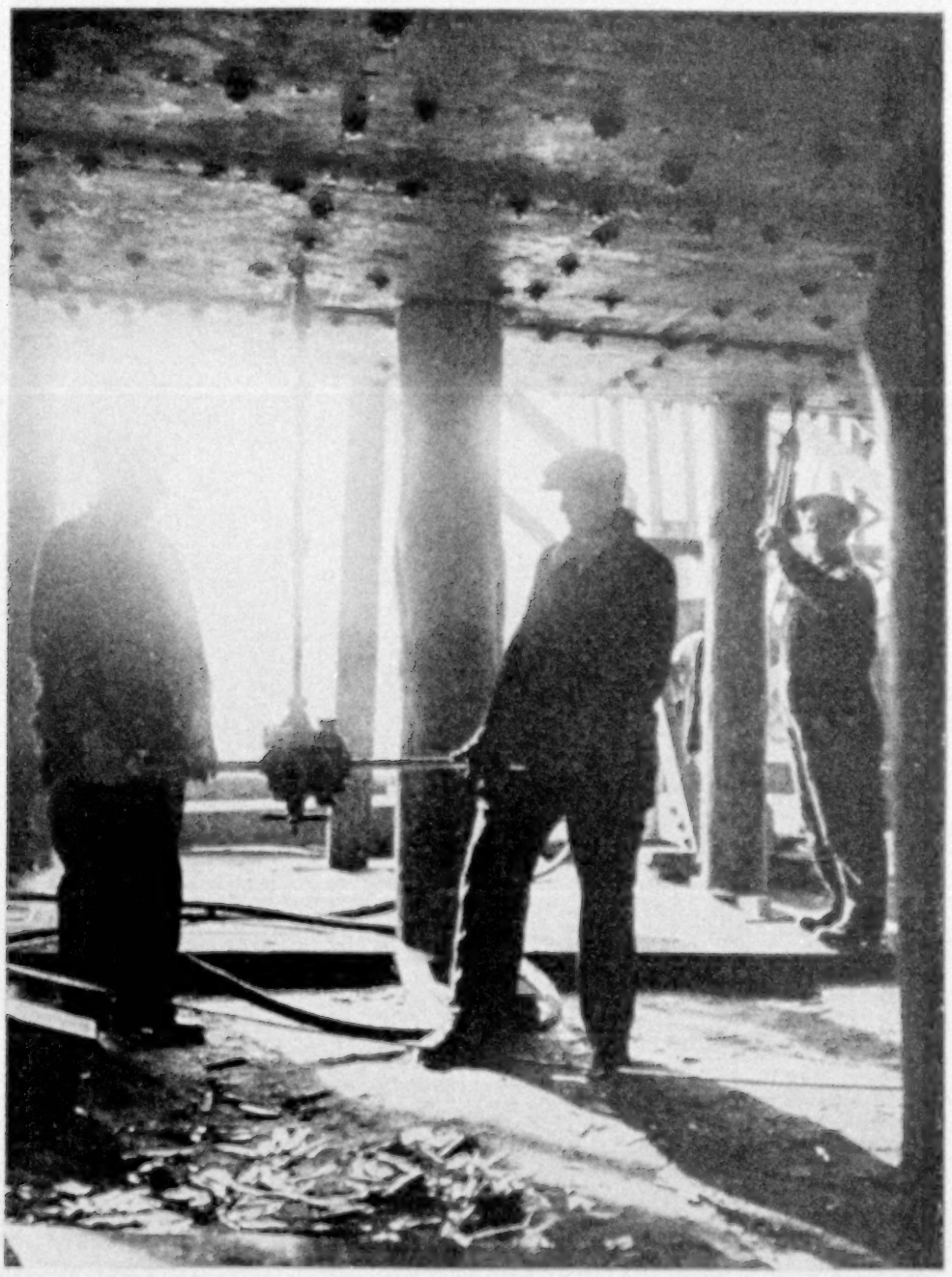
© Committee on Public Information

WORKING IN TIERS ON THE SIDE OF A FABRICATED SHIP

At the top may be seen the reamers, correcting slight discrepancies in the rivet holes. In the middle are two painters. On the third platform are the workmen who bolt the plates together temporarily while they are being permanently fastened by the riveter.

man's slogan—"Speed up!" Hence the many riveting contests which were staged in every shipyard in the country until the concentration of attention on this particular branch of the industry threatened demoralization of the coördinate branches. But the riveter is still the hero of the hull in the eyes of the people.

Many have been the astonishing records of rivets driven in 8 or 10 hours, and a flood of controversy has resulted. Perhaps it is better to avoid disputation by omitting stellar single-day achievements. A clearer idea of the work actually accomplished may be gained from the recital of such records as that of one team in a Pacific Coast yard which drove an average of 697 rivets a day for 26 consecutive working days of the month, in every part of the ship. A thousand rivets a day is not unusual for certain parts of the hull, but 400 rivets a day for all gangs is a conservative estimate.



© Committee on Public Information

REAMERS AT WORK BENEATH THE BOTTOM OF A SHIP

Their trade is to rectify the inaccuracies and mistakes of others. With the various parts of the ship made in many widely separated sections of the country, under a variety of conditions, the rivet holes of two plates to be joined frequently do not coincide properly. The reamers use their air-driven machine to rout out the holes so that the rivets may be driven home straight.

The riveter is permitted to choose whether he shall be paid by the day, at 70 to 80 cents an hour, or by piece-work (from $4 to $6 a hundred, according to the part of the ship in which he is riveting). If he is engaged in piece-work he takes 44 per cent of the total, the bucker-up gets 33 per cent, and the heater of the rivets gets 23 per cent.

SCHOOLS FOR RIVETERS

So great has been the demand for riveters that it was impossible to supply them from the structural iron-work trades at the beginning of our intensive shipbuilding program. Schools for riveters were established, therefore, and these are still in highly successful operation in many yards. A man of the proper physique (he must be stalwart to stand up against the thrust of the hammer, whose lightning blows register 50 tons a minute) can usually learn to be a riveter in 10 days or two weeks, devoting from 8 to 10 hours a day to instruction

© Committee on Public Information

MARKING OUT A PLATE WITH A TEMPLATE PREPARATORY TO PUNCHING RIVET HOLES

The pattern from which a ship's steel plates are cut and the rivet holes punched is called a template; upon the care with which it is made depends the speed with which the thousands of parts of a fabricated ship can be assembled.

and practice; but there is one case on record where a class of three men learned the art in 20 working hours of schooling.

While the riveter pupil is in the school the shipyard pays him 50 cents an hour. Something of an anomaly, this plan of paying a man for the privilege which is given him to learn a trade and equip himself for greater earning capacity! However, no inducement which can be offered is too great, provided the requisite number of competent workmen is obtained to accomplish the end in view.

WOMEN WORKERS IN THE SHIPYARDS

In surveying the varied activities of the ever-increasing army of men engaged in shipbuilding, the observer or correspondent making a tour of the firing lines of industry is apt to think of woman's share in the vast undertaking as purely decorative, her presence being essential only when the bottle of christening wine is to be broken upon the vessel's bow as

"She starts—she moves—she seems to feel
The thrill of life along her keel,
And spurning with her foot the ground,
With one exulting, joyous bound,
She leaps into the ocean's arms."

Before this war that was woman's sole prerogative in the shipyard—sponsorship at a launching. But in these days patriotic service knows no distinction of sex, and wherever woman can help she is to be found by man's side sharing his burdens and responsibilities. The shipyard is no exception.

Among the clerical forces in the administration buildings and as nurses in the hospitals of the 203 shipyards, the women workers are finding their most abundant opportunities to lend a hand in the construction of the "bridge of ships" across the Atlantic; but they are to be

found toiling with the manual laborers, too, just as are the women of Great Britain.

It is at oakum spinning, preparing the material used by the calkers in sealing the ship's seams to prevent leaks, that feminine hands are most frequently employed. In a Gildersleeve, Conn., shipyard there is Miss Anna Lackman, who after a few weeks' practice was spinning half a bale more oakum a day than any man in that yard had ever spun. Down in Houston, Texas, there is one of 40 women oakum spinners who, in order to begin her nine-hour task in the shipyard by seven o'clock, has to get up at 4.30 every morning and travel 15 miles to her job. Her cheerfulness in the face of hardship is an inspiration to all the men in the plant. At the other end of the country, out in Vancouver, Wash., Mrs. G. R. Underwood is leader of a gang of calkers. She explains her enthusiasm for her work by the fact that she has given her two sons to her country, both being in France fighting for the sanctity and safety of her home.

A few days ago the president of the shipyard in which she was employed observed that Mrs. Underwood looked tired and fagged.

"It has been a rather hard day," she admitted, "but I am all right and there is enough oakum on hand to keep the calkers busy."

Upon investigation it was found that her four assistants had failed to report for work that morning; so she, single-handed, had manned the machines all day and kept the supply of oakum strand running steadily out to the men in the yards.

Such is the spirit of the women workers of America in our shipyards!

THE SHIP NEEDS OF PEACE

In order to understand and appreciate the task which lies before the American shipbuilder, it is first necessary to know the amount of merchant shipping which was employed in meeting the ordinary demands of peace, the amount which has been destroyed since the beginning of hostilities, and the rate at which shipyards have been launching sea-going craft during the last four years.

In the year 1914, before the Hun ran amuck, the world's water-borne trade was carried in 30,500 vessels of more than 70,000,000 deadweight tonnage.* Of that international fleet more than one-third sailed under the British flag. The United States stood second among maritime nations, with something less than one-eighth of the total tonnage, while Germany ranked third, with a little more than one-tenth of the total. But while most of Great Britain's and of Germany's ships were engaged in foreign and colonial trade, only one-fifth of America's ships belonged to that class. Vessels that flew the Stars and Stripes in foreign ports before the war totaled less than one-fortieth of the world's tonnage.

Since August, 1914, the world of commerce has lost 21,500,000 tons of Allied and neutral shipping—more than one-third of the sea-going tonnage existing at the outbreak of the war. The major portion of this loss is directly attributable to the German submarine, the remainder to normal depreciation, storm, fire, collision, and wreckage.

During these four years the Entente nations, the United States, and neutral

* While it is the custom in official reports of maritime nations to employ the term "tonnage" as meaning gross tons, unless otherwise specified, the former chairman of the United States Shipping Board in his public announcements employed deadweight tonnage as the standard. To avoid double confusion, the deadweight-tonnage standard has been adhered to by the present officials of the Board, and in this article the deadweight standard of measurement is meant. While there are many kinds of tonnage, the three principal standards are the gross, the net, and the deadweight. Gross tonnage expresses in units of 100 cubic feet the entire cubical capacity of a ship, including spaces occupied by cabins, engines, boilers, and coal bunkers. Net tonnage expresses in units of 100 cubic feet a ship's capacity after deductions have been made for cabins, machinery, etc. Deadweight tonnage is the maximum weight of cargo, bunkers, consumable stores, passengers, and crew—a ship's weight-sustaining capacity. For all practical purposes, the deadweight of a ship may be derived from the gross tonnage by adding 50 per cent to the latter—that is, a vessel of 1,000 gross tonnage is reckoned as having a deadweight tonnage of 1,500. The net tonnage is dependent upon many factors and cannot be so readily determined either from the gross or deadweight tonnage.

XUM

powers have made good two-thirds of that shrinkage (14,000,000 deadweight tons) by the construction of new ships, and have further added to their merchant-fleet assets by taking over 3,795,000 deadweight tons of enemy shipping, either captured on the high seas or seized in Entente and American ports. Thus, deducting the new shipping and the seized tonnage, the commercial world, exclusive of Germany and Austria, has suffered a net shrinkage of a little less than 3,500,000 tons in four years, due to the "spurlos versenkt" creed of ruthless Prussianism.

Three and a half million tons does not represent the full economic loss to allied and neutral commerce, however, for had the world remained at peace and shipbuilding continued as during the years immediately preceding the war, there would have been an increase of more than 14,500,000 tons instead of a net loss.

THE SHIPPING BOARD'S PROGRAM

In order to erase that "overdraft" of 3,500,000 tons of shipping and establish a credit balance on the ledger of sea-going vessels, the United States has launched upon the most extensive and most ambitious building enterprise ever conceived by a maritime nation. The complete program of the United States Shipping Board on September 1, 1918, provided for 2,249 contract ships of wood and steel, having a deadweight tonnage of 13,212,712; 32 concrete ships of 301,500 deadweight tons; 402 requisitioned ships of 2,790,000 tons, making a total of 2,693 sea-going vessels aggregating 16,305,004 deadweight tons, besides 170 barges; 279 steel, wood, and concrete tugs; 100 trawlers, and 25 harbor oil barges.

It will take many months to complete so vast a program—how long no one in authority will dare predict. Promises and prophecies are alike taboo in shipping circles, but there is no ban on making public the work already completed, and he who cares to hazard a guess or an estimate based on accomplished facts is welcome to do so. Let us see.

WHAT HAS BEEN DONE

Before the United States entered the war, our record shipbuilding year showed a production of 285,000 deadweight tons of ocean-going steam vessels of 1,500 deadweight tons and over; during the 31 days of August, 1918, the deliveries to the Shipping Board from American shipyards amounted to 313,380 tons of ocean-going steam vessels—in *one month* of war-time effort a production 10 per cent greater than that of the banner *twelve months* before we began to fight.

That August shipbuilding record is one of which the nation may well feel proud, for it overtopped by more than 17,000 tons the best month of any year in British shipyards. But these figures are merely the cheerful beginning of far greater accomplishments, if all goes well. Our shipyards are not ever yet all in production.

In August, 1917, America had 37 steel and 24 wooden shipyards. In August, 1918, we had more than double that number of steel yards and nearly five times as many wooden yards as we had 12 months previously. Today we have 410 completed shipways for steel ships and 63 yet to be finished; 400 completed wooden, composite, and concrete shipways and 54 under construction or to be added—a total of 927 shipways under the supervision of the Emergency Fleet Corporation. It is conservatively estimated that each shipway, when operating with a full shipbuilding crew, should launch annually three ships averaging 6,000 tons each. It is further estimated (not predicted or promised!) that with 751 of our 927 ways used for the construction of cargo ships 13,518,000 deadweight tons should be produced annually when our shipyards attain their full development.

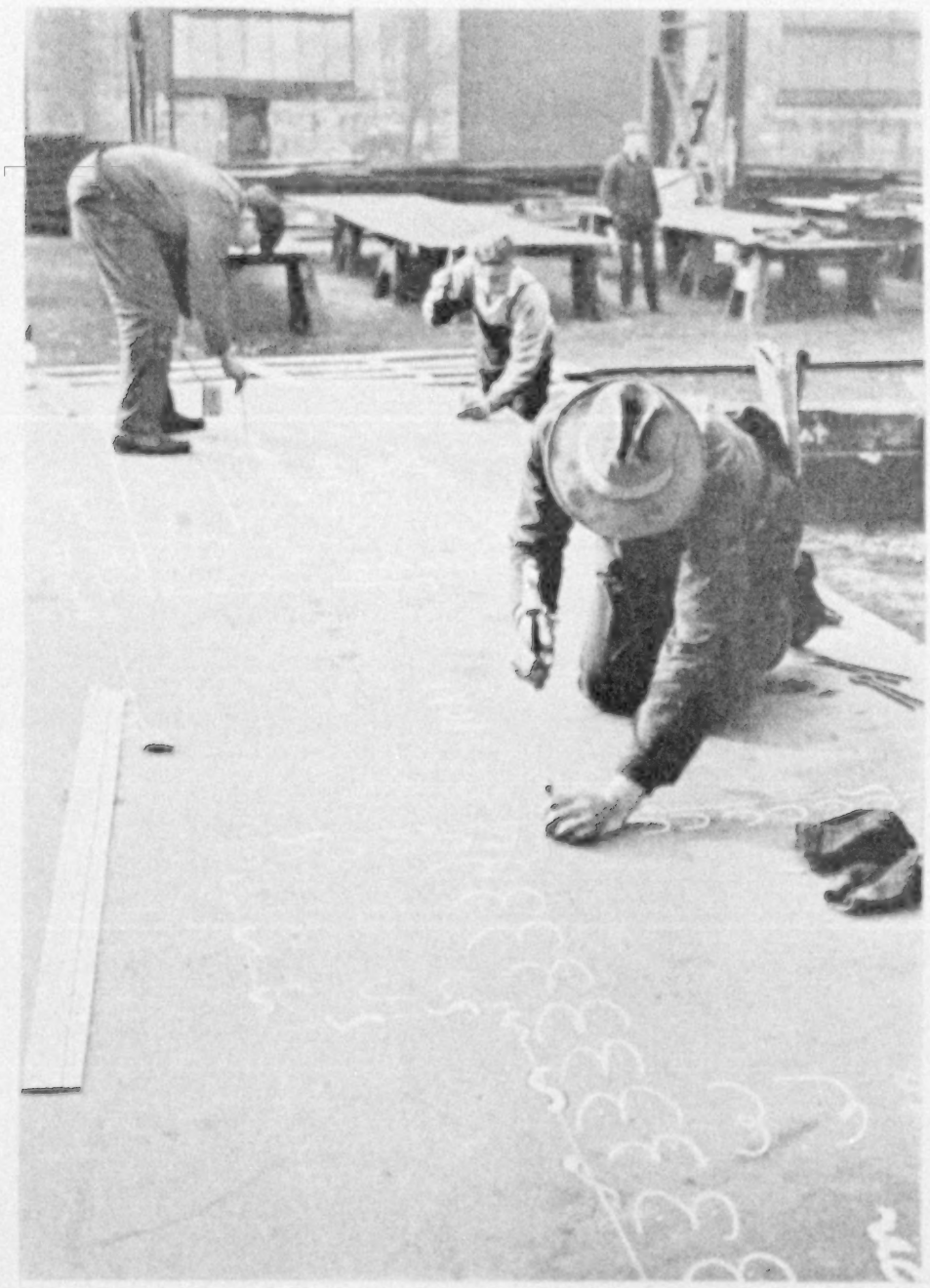
A CONSERVATIVE PREDICTION

Such prospective achievements tower so tall as completely to overshadow accomplished facts; yet the great gap between what may be done and what has been done to date should not discourage, but rather inspire the nation to redoubled effort. The actual deliveries of sea-going vessels of more than 2,500 tons by American shipyards to the Shipping Board during the first eight months of 1918 was 1,626,052 deadweight tons—a most encouraging record when it is realized that this exceeds by 80,000 tons the total production of vessels of more than 150 tons

during the same period by all the shipyards of the United Kingdom, hitherto the world's premier shipbuilding nation.

Thus far, our shipbuilding activities might well be compared with a ship on the ways a few moments after the confining braces and stanchions have been sawn asunder. The great craft is slowly gaining headway and it is sweeping irresistibly forward. The total production for 1918 will be more than 3,000,000 tons; Charles M. Schwab, director general of the Emergency Fleet Corporation, overcoming his reticence with respect to prophecy, has himself predicted it.

Between August 30, 1917, and August 31, 1918, our American shipyards delivered to the Shipping Board 325 completed ships, aggregating a few thousand less than two million tons. On July 4th of this year 95 steel, wood, and concrete ships were launched, representing a deadweight tonnage of 475,000, and that month showed a total launching of 126 vessels of 634,000 tons—more than double the tonnage launched in any one month by any other nation in the history of the world.



© Committee on Public Information

MARKING OUT A SHIP'S SIDE PLATE FOR THE PUNCH

This work can be done in a score of industrial centers, and when it is finished the plate is sent to the shipyard, where it is put in place by the erectors and "sewed" to the hull with steel stitches in the form of rivets.

America is not relying solely upon the production of her own shipyards. Japan has been commissioned to build 45 steel vessels for the Shipping Board, and the first of these, the 9,000-ton cargo-carrier *Eastern Sun*, reached our shores and was placed under the American flag in June. In addition to the ships now being built by the Mikado's people, 23 of their steel vessels of 145,000 tons have been chartered by our government.

THE SHIPPING BOARD'S GREAT FLEET

Of course, a great addition to our merchant fleet came in the taking over of enemy-owned vessels, 100 in number and aggregating 644,000 tons. The 81 commandeered Dutch ships also added nearly half a million tons, while 878 ships belonging to foreign governments, but now

© Committee on Public Information

THIS IS THE TYPE OF MEN WHO COMPRISE AMERICA'S INDUSTRIAL ARMY OF 400,000, WHICH IS FIGHTING THE HUN WITH STEEL PLATES AND GLOWING RIVETS

under charter to the Shipping Board and to American citizens, have added two and three-quarter million tons.

These accretions, together with new ships delivered, American ships requisitioned, lake steamers converted into seagoing craft, and American merchant vessels not yet requisitioned but at its disposal, comprise a fleet of 2,185 vessels over which the United States Shipping Board has or may exercise jurisdiction—a total of more than nine and a half million deadweight tons.

It must be borne in mind, however, that this does not represent the tonnage which we can utilize for the support of our armies in France. For these ships there are many needs, some of which vitally, even if indirectly, affect the maintenance of our troops abroad.

We are still far short of the tonnage required, and in meeting that shortage the details of our magically revived shipbuilding industry come into view.

In the yards devoted exclusively to the construction of merchant ships there is employed today an army of riveters, erectors, reamers, heaters, calkers, painters, designers, machinists, pile-drivers, carpenters, shipwrights, riggers, coppersmiths, plumbers—in all the representatives of 30 trades. It is an army numbering as many souls as there are men, women, and children in war-time Washington—400,000. And the weekly payroll of that army is nearly $11,000,000. At that rate, in one year our shipyards will pay out in salaries and wages alone a sum exceeding by $100,000,000 the total annual gross revenue of every State in the Union.

But the game is worth the candle! We pour millions into the shipyard hoppers, and cargo-carriers glide down the ways with a rapidity which would have been pronounced wholly beyond the realm of possibility eighteen months ago.

THE STORY OF THE TUCKAHOE

Take the case of the 5,500-ton freighter *Tuckahoe*. Just 37 calendar days from the hour when its keel was laid it was declared ready for service. Launched at Camden, N. J., in 27 days, fitted out in 10, it was loaded with 5,000 tons of coal in Baltimore on the 40th day after its keel-laying, and began its amazing career

as a cargo-carrier to Boston, setting a pace of four round trips a month between the Maryland and Massachusetts ports. It is a record which cannot but thrill the most phlegmatic.

The *Crawl Keys*, built on the Great Lakes, even betters the *Tuckahoe* record by three days, but it is a smaller vessel—3,500 tons. It was launched in 16 calendar days and placed in commission 18 days later.

One of the most spectacular achievements of the Emergency Fleet Corporation, the ship-manufacturing branch of the United States Shipping Board, was the launching of the 12,000-ton *Invincible*, at the Bethlehem works, Alameda, Cal., 23 days and 23 hours of working time from the moment of keel-laying. In the construction of this vessel, which is more than 457 feet long, with a beam of 56 feet and a depth of 38 feet, 1,500 shipbuilders, working in three 8-hour shifts, handled 137 tons of erection steel every 24 hours, and 100 riveting crews scored a daily average of 40,000 rivets driven home.

THE PACE-SETTING SHIPYARD

While these three ships mark the highest of the high lights in our building efforts, the honors for sustained performance over a long period go to the shipyard of Skinner & Eddy, of Seattle, Washington. With only five ways, on which an average of 4,527 men have been employed, this firm delivered to the Shipping Board during the eleven and a half months ending September 1, 21 steel cargo-carriers of 194,000 tons. Eight of the contract steel vessels, which have been delivered to the Board in less than 100 days from the time of keel-laying, have come from this plant, which has been producing ships at the rate of a little more than an eighth of a ton per man for every day in the year. At that rate it would require only 225 of the 751 cargo shipways now in existence in this country to produce 10,000,000 tons of ships in twelve months, with 250,000 men employed.

These speed records do not assume their proper significance until it is recalled that prior to 1914 the time ordinarily required for the completion of a 7,000 or 10,000 ton cargo-carrier was from 9 to 18 months; frequently two years.

MOBILIZING MAN POWER

How the government is solving the problem of mobilizing its man power for all the essential industries of war, and especially for the shipbuilding and munition plants, is a major story in itself. It can only be suggested here.

Through a remarkable campaign of publicity in the lay press, in labor journals, by means of striking posters, and by the employment of an industrious army of labor scouts, a host of skilled workmen has been recruited for the 203 shipyards. Many of these workers had never seen a ship when they walked into the employment offices. Some of these recruits proved irremediable misfits, but the great majority have made good the claim that the American workman has more mental alertness and greater adaptability than the manual laborer of any other nation on earth.

The process of recruiting is still going on and will continue to the end of the war and after, for our output of ships, shells, airplanes, and all the other machinery and material of modern warfare is limited not by raw products but skilled man power.

The United States Employment Bureau, recently organized as an adjunct of the Department of Labor, is still progressing with the slowness of an infant organization, but the encouraging fact remains that it *is* progressing. In its efforts to mobilize labor for the industries most in need of skilled workmen—of which the shipbuilding plants are among the chief—it has sought and is receiving the cordial support of union labor. Occasionally there are differences which threaten a temporary divergence of aim and dissipation of energy, but on the whole the plans are bearing fruit.

THE COMMUNITY LABOR BOARD

One of the agencies through which the Bureau is now working is the Community Labor Board, established in the principal industrial centers throughout the country. It is composed in each instance of three members—one representing the community's employers, the second its

Photograph by Paul Thompson

OXY-ACETYLENE WORKERS CUTTING STEEL PLATES

The oxy-acetylene flame and the electric arc have been potent factors in supplying the United States with tonnage. Through their use the machinery of the damaged interned German ships was quickly repaired. Recently there was launched on the southern coast of England a steel vessel built without rivets. Instead of riveting and calking the plates, they were joined in one process by electric welding. It is computed from the results obtained on this experimental ship that a saving of 20 per cent could be effected in both time and material if the welding process were to supplant riveting.

XUM

employees, and the third, who is the chairman, the United States Employment Service.

It is the purpose of these boards to supervise the recruiting and the distribution of workers for war production. If they fulfill their important mission, it is hoped that they will be able to counteract one of the abuses in the shipyards of which many executives are complaining—the practice of one yard endeavoring to induce another yard's workers to leave their present employer and join the forces of the proselyting plant. This practice has become so flagrant in some communities that the heads of industrial relations departments find it necessary to keep secret-service men stationed at their own gates in order to detect the employment agents of rival concerns. In several places incipient riots have been narrowly averted as the result of these practices.

MAINTAINING MORALE IN THE SHIPYARDS

After workmen have been mobilized from non-essential occupations and dispatched to the shipyards, one of the most important tasks of the Emergency Fleet Corporation is to induce the men to continue on their jobs, working with 100 per cent efficiency—in other words, to inculcate and maintain morale in the plants.

Every important yard in the country today has its director of industrial relations—the man who is responsible for the morale of the men. Upon the shoulders of no other individual in a yard rests a greater responsibility than upon this director.

He employs a thousand devices to add to the comfort and insure the contentment of his men and to spur them on to the greatest possible effort. The four-minute patriotic speakers; the concerts by a band composed of shipyard workers; the admirably edited and attractively illustrated weekly newspaper, issued at all of the larger yards and distributed gratis among the men; the ably managed cafeteria; the completely equipped grocery store, where foodstuffs may be purchased at the smallest possible margin above wholesale cost; the hospital equipment and the sustained effort to inculcate the principle of safety first; the efficiency and courtesy of the uniformed military police, who protect the yard from criminal outrages of enemy aliens; the detective force, ever vigilant to discover the first signs of insidious enemy propaganda or sabotage among the men—all these and many more are cares which directly or indirectly are the responsibility of the head of the industrial relations department.

Charles M. Schwab is an industrial relations man. His official title is Director General of the Emergency Fleet Corporation; but it is due not so much to his ability as a "captain of industry," in the sense of an office organizer, that America is indebted for the immediate success which signalized his entrance into the work of building the nation's ships. It is to his flashing genius as a creator of morale among workingmen, of whom he was once one, that we owe much of the rapid advance of the building program.

When the history of America's titanic efforts as a shipbuilding nation in time of war comes to be written, the broad and unselfish vision which prompted Edward N. Hurley, chairman of the Shipping Board, to choose a colaborer of Mr. Schwab's caliber for head of the Emergency Fleet Corporation, will command universal admiration. Instead of dividing the glory of the accomplished task between them, Mr. Hurley and Mr. Schwab multiply it, for the work of each is equally essential to complete fulfillment of the country's needs.

CUTTING DOWN THE TURN-OVER

One of the most serious problems which has been encountered in the effort to maintain and elevate the morale of the shipyard workers has been the enormous change in the personnel of the working force from week to week—the turn-over, as it is called. At one time, at the Hog Island plant—the largest shipyard in the world, with its 50 ways, employing more than 30,000 workmen—more than seven times as many new laborers were enrolled each week as remained on the payroll on Saturday night. Not only was this vast shifting army of so-called workers demoralizing to the men who could be induced to remain on the job, but they constituted a discontented crew, spreading throughout the land a tale of dissatisfaction which kept other workers from

XUM

applying for employment at this great industrial institution.

How that condition has been combatted and successfully corrected at Hog Island is one of the really big industrial achievements of the war. Today, instead of being a "horrible example" for every other shipyard in the country, the Hog Island Labor Control Office is fast making that yard a model not only for shipbuilding plants, but for steel mills, munition and ordnance factories as well.

The basic idea of the Labor Control Office is one of great simplicity—the treatment of the workman as an individual, not as one of a mob. Nowadays every man who applies for work at the Hog Island yard first passes through the Labor Control Office, where his qualifications are recorded. He is told that he can quit his job whenever he pleases, but that before he draws his last day's pay he must leave the yard through this same office and confide to some one why he doesn't wish to remain.

Every workman, whether he be a coppersmith earning $1.50 an hour or the lowliest water-carrier or rivet passer, making only a little more than that amount a day, has the privilege of coming to the Labor Control Office and airing his grievance, whatever it may be. The time that he loses in making his complaint is paid for just as if he were working. It is costly to the yard, for many of the grievances are petty in the extreme; but it is far less costly than to have that army of discontented workers quitting every day and spreading their discontent elsewhere.

One of the most effective methods of eliminating grievances has been the selection of a corps of intelligent workmen to patrol the yard as investigators. If they "make good" in this work they are eventually brought into the Labor Control Office as interviewers.

The ideal interviewer is the occupational expert who not only can win the confidence of the man who applies for a job, but who can "size up" that man and set him to the task to which he is best fitted. But the most important work of the interviewer is to make every workman feel that he has a friend higher up. Only a few days ago one of the most skillful occupational experts employed in this work of interviewing was dismissed because "he didn't know how to smile"; it was impossible for him to establish a bond of confidence between himself and the interviewee.

So effective has the work of this Labor Control Office at Hog Island proved that in one week more than 7,500 men were dissuaded from leaving, and were either returned to their old work or transferred to some new task to which they were better suited.

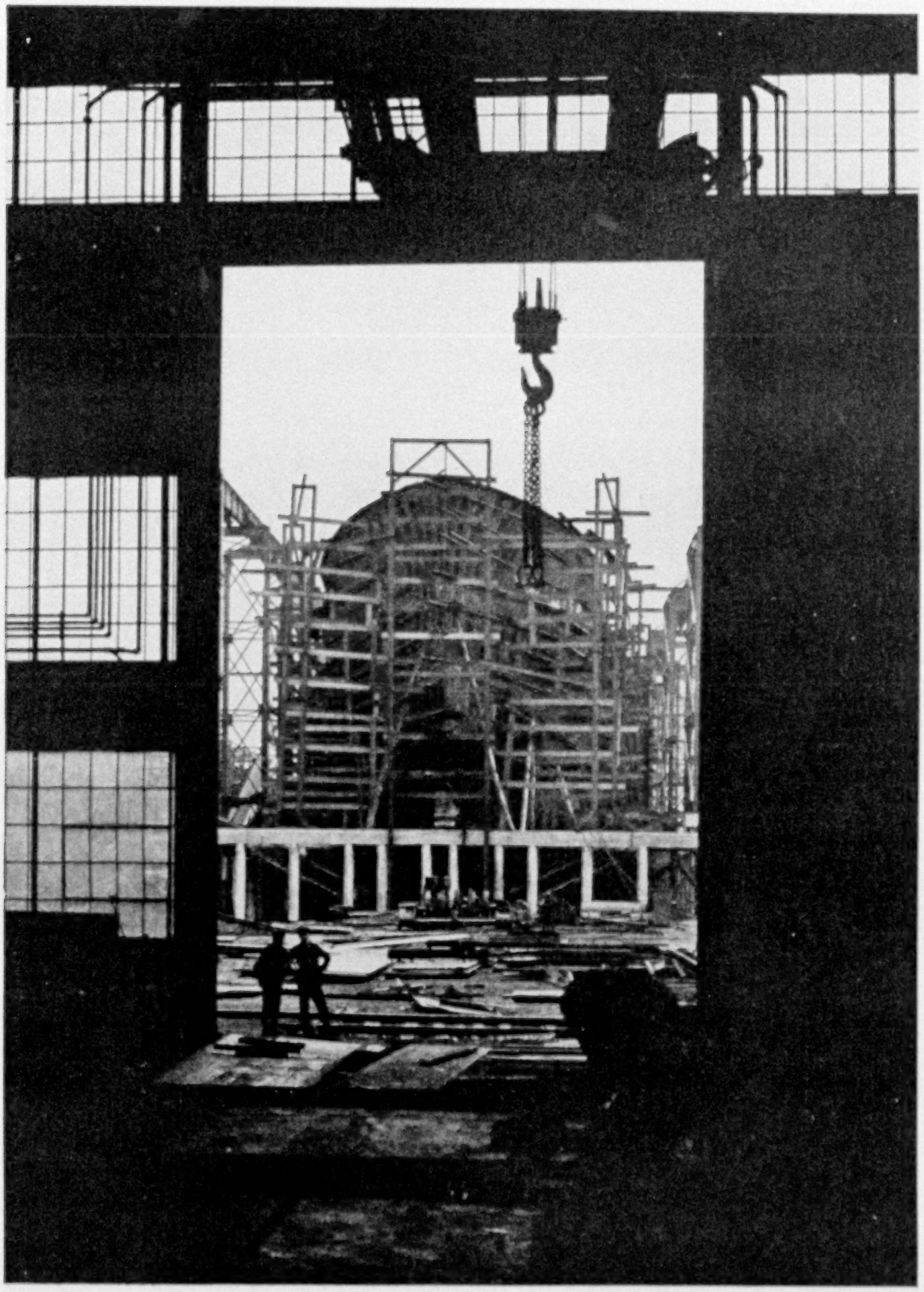
To keep in touch with the labor force at Hog Island is like trying to know personally every man, woman, and child in a town of 30,000 inhabitants—not only know their individual capabilities, but their idiosyncracies of temperament and their social viewpoint.

THE DEVELOPMENT OF HOG ISLAND

Hog Island, incidentally, is a wonderful industrial center. Just a year ago it was an 860-acre expanse of swamp and bog, lying practically inaccessible a few miles beyond the outskirts of Philadelphia. The work of construction, of draining, and of road-building began in October, 1917, and in spite of the delay occasioned by a winter of unparalleled severity, it is today, by virtue of the expenditure of $35,000,000 and immeasurable labor, an area of magic activity, with more than 70 miles of criss-crossing railroad tracks; an electric power plant sufficient to supply the combined needs of the cities of Albany, N. Y., and Richmond, Va.; a water system with twice the capacity required for a city the size of Atlanta, Ga., and a mile and a half of shipways stretching along the waterfront.

From the 50 ways of this yard there will be launched 180 ships, the contract price for which ($230,000,000) is double the entire gross revenues of Bulgaria and Turkey during 1914. These 180 ships will have a tonnage sufficient to maintain more than 400,000 of our troops in France. Seventy thousand freight cars full of material will go into the making of these fabricated steel vessels.

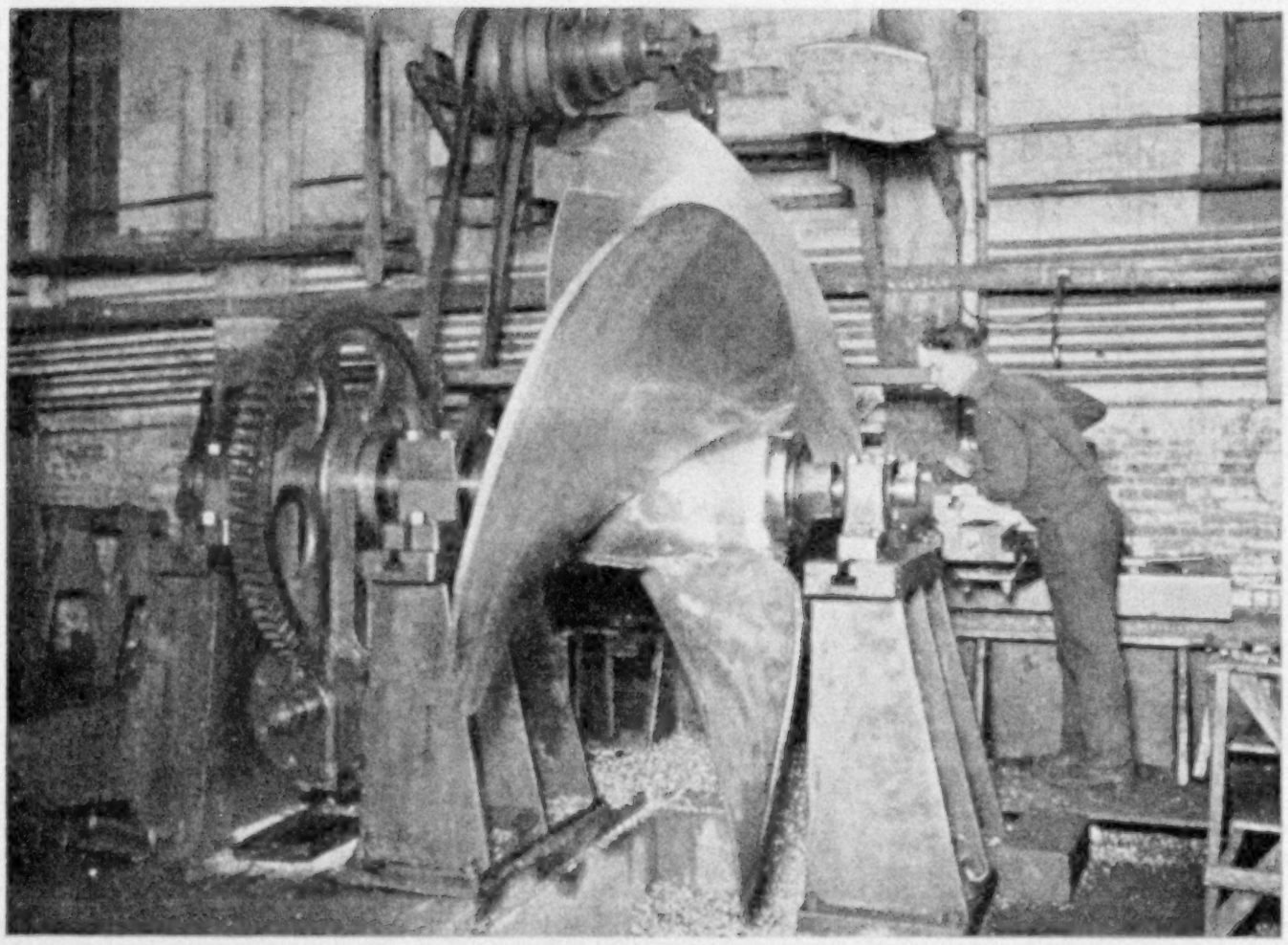
One important method of increasing the labor resources of the shipyards has been the successful effort to reduce the percentage of accidents, which, in the



© Committee on Public Information

FROM SHOP TO SHIP

It requires six and a half million pounds of material to build a fabricated steel ship of 7,500 deadweight tons capacity, and nearly half a million rivets are needed to hold the parts together.



© Committee on Public Information

A SHIP'S PROPELLER IN THE MAKING

For merchant vessels equipped with comparatively slow-moving engines, four-bladed propellers are used. The three-bladed propellers are usually used on fast merchant and naval ships. The first screw man-of-war ever built in any country was the U. S. S. *Princeton*, of 1,000 tons, launched less than 80 years ago.

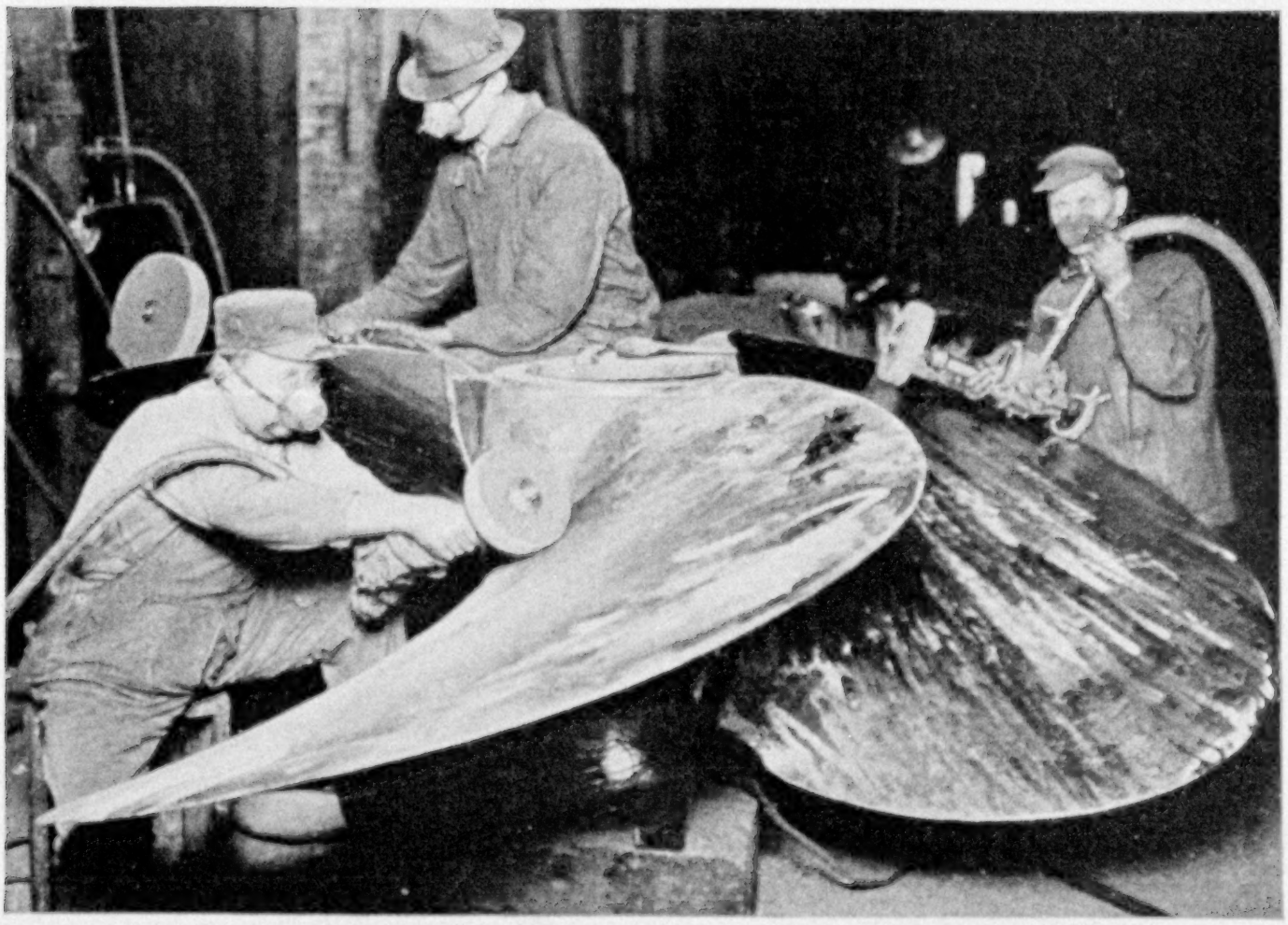
rush and confusion of the early days, was excessively high. In one great yard early this year 141 men out of every 1,000 employed during one month were injured, the average length of time lost by each injured worker being 17 days. Five months later the percentage of accidents had been reduced nearly two-thirds, and the average number of days lost from work by the injured men did not exceed six.

The chief factor in bringing about this gratifying decrease in casualties has been the safety-first educational propaganda upon which the directors of industrial relations insist. Much of the credit is due, too, to improved hospital facilities, which enable injured men to receive immediate treatment, thus greatly lessening the danger of infection.

The percentage of accidents in the shipyards throughout the country today is not as high as in the steel mills, but corresponds to the general industrial rate. The Submarine Boat Corporation of Newark, N. J., which ranks second only to Hog Island in size, having 28 shipways, claims a world record for safety, in that it launched four ships without a fatality.

HOUSING CONDITIONS WHICH AFFECT MORALE

In time of war the word *morale* comes to have a significance so broad as to embrace all conditions which affect man's social relations and physical surroundings as well as his mental attitude, and the morale of the shipbuilder, like that of every other workman employed in an essential industry, is of as far-reaching importance in achieving ultimate victory as is the stamina of the man who operates a machine-gun or leads a bayonet charge.



© Committee on Public Information

FINISHING A SHIP'S PROPELLER WITH A BATTERY OF EMERY WHEELS

This operation fills the air with a dust of emery and bronze particles which proves disastrous to the workmen if it is drawn into the lungs. The wearing of dust masks is essential to health.

In the expansion of existing shipyards and the establishment of new plants, the Emergency Fleet Corporation was, at the very outset of its activities, brought face to face with a critical menace to the workingman's morale—the problem of where and how he should live. Thousands upon thousands of laborers were needed to construct the shipways, to lay the railway tracks necessary for the economic distribution of material, to erect machine shops, executive quarters, hospitals, restaurants, and commissary depots.

In the majority of cases the shipyards were being built on low-lying waterfronts, sometimes far removed from cities. In every instance there was an influx of population so large as to overtax with distressing results the normal housing facilities of the several communities. Often the question for which shipyard contractors had no answer was not "Where can I get labor?" but "How can I house the labor which I have?"

Much of the labor turn-over during those first few months was due in large degree to the impossible living quarters of the men as well as to the confusion and generally unsatisfactory conditions within the yards themselves.

Many expedients were employed to overcome the difficulties. Some of these, such as the construction of tent cities, were obviously temporary solutions. In other cases, however, the plan adopted was such as may have a lasting and salutary effect upon the whole housing proposition in congested industrial districts. A typical example of the latter is that undertaken by the Merchant Shipbuilding Corporation in Bristol, Pa., where 14,000 men are employed.

The living accommodations at Bristol being incapable of expansion to the needs

© Committee on Public Information

A TRACK CRANE CARRYING A PROPELLER FROM THE MACHINE SHOP TO A SHIPWAY TO BE FITTED ON THE SHAFT

The military police are conspicuous in many shipyard pictures nowadays. Every precaution is taken against enemy bomb outrages. A stick of dynamite in a shipbuilding plant is as much to be dreaded as a Whitehead torpedo at sea.

of the hour, the Emergency Fleet Corporation came to the financial aid of the Shipbuilding Company and a complete city of homes was erected.

BUILDING A CITY OF HOMES TO ORDER

On a tract of 155 acres adjoining the plant, a model town was conceived with the aid of experts in city planning. Broad thoroughfares were laid out, spaces for parks set aside, and locations for schools, churches, bakeries, restaurants, and for a theater, city hall, and department store were designated.

That was a few months ago. Today a $5,000,000 city of dwellings is nearing completion, not after the higgledy-piggledy fashion in which the Topsy boom towns of the past have "jest growed," but after a well-ordered, scientific plan.

The first impression which the visitor gains of this shipworkers' town of Harriman, with its 5,000 dwellers, is that of architectural comeliness. There are no frail, spindle-shanked three and four-story frame tenements with windows and doors flush against the outer walls, reminding one of a person without eyebrows; there are no tortuous alleys; no rows of tatterdemalion shacks and leantos surrounded by tumble-down, snaggle-tooth picket fences; no unkempt areaways; no fire-escapes adorned with all imaginable articles of intimate family wash; no vacant lots strewn with tomato cans or other goat pasturage. In contrast, there are more than a score of attractive stucco, slate-roof homes of six rooms each, 232 group houses of four and five rooms each, 200 three and four room apartments, and 60 brick homes, accommodating more than 500 families. The bachelor quarters include lodging houses, open dormitories, and a small number of neat bungalows, providing for the comfort of 2,300 men.

Every home has electric lights, porcelain bath, and hot-air heat. The apartments and bachelor quarters have porcelain tubs or showers, electric lights, hot water, and steam heat.

A VALUABLE EXPERIMENT IN HOUSING

Rents are fairly moderate. The most desirable homes in the community, those which face a wide, curving boulevard and are surrounded by attractive lawns, may be had at from $36 to $42 a month. Bachelor accommodations range from $1.75 to $3.00 a week, including attendance, the housekeeping being conducted by three-score orderlies under the direction of four foremen.

The school-house, with its spacious playground, is thoroughly modern in its lighting, ventilation, and sanitary arrangements, a ten-room structure furnished and equipped after the most approved standards.

At present the Y. M. C. A. building is the club-house of the town, and a temporary hall, with a seating capacity of 1,500, is serving as a community assembly room until the theater is built. The community bake-shop is run in conjunction with the cafeteria, where the equipment is ample to supply not only the inhabitants of Harriman, but all the other workers in the shipyard.

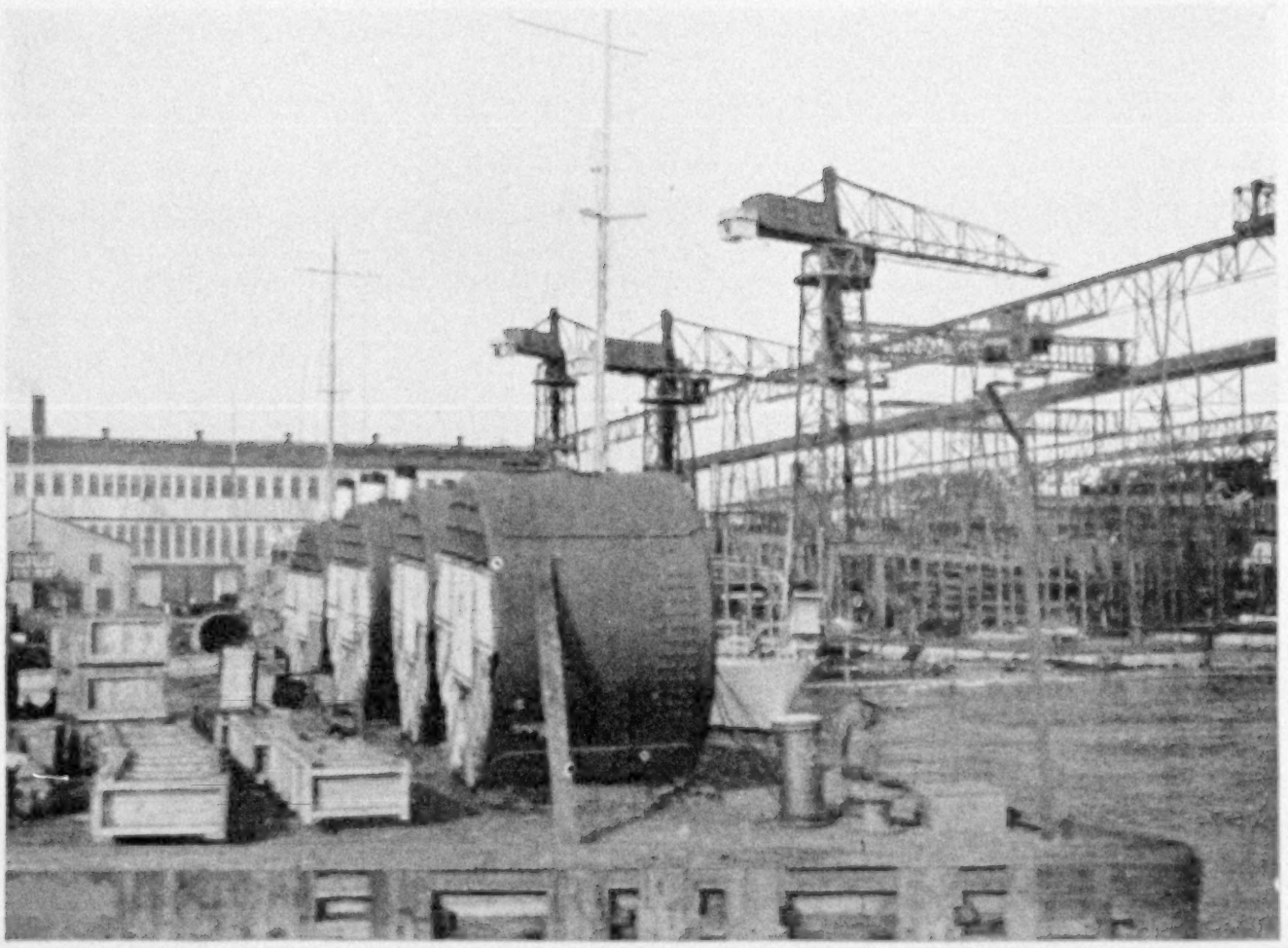
There is no municipal government in Harriman, for it is not incorporated. W. F. Smith, who has the title of city manager, is the mayor, council, and board of aldermen—the Pooh Bah of the community and vice-regent for the shipbuilding company and for the financial sponsor of the model city, the Emergency Fleet Corporation.

Harriman promises much, not merely as the fulfillment of an urgent need in time of war, but also as a valuable experiment in community housing. It has its defects, many of them, one being the danger of depriving its dwellers of civic responsibilities, but it is a long step in advance of the makeshift housing methods which obtain in so many industrial centers. It is worthy of close study, and may afford worth-while lessons for those who are to rebuild the devastated villages of Belgium and northern France.

THE TASK OF MANNING OUR NEW SHIPS

Finding men to build the ships and providing places in which they can live while so employed present larger difficulties numerically, but in no degree less serious or more immediate than finding officers and crews to operate the ships as they are completed.

The American seafarer, one of the hardiest, most resourceful, and pictur-



© Committee on Public Information

SCOTCH MARINE BOILERS READY FOR INSTALLATION ON A NEW MERCHANT LINER

Sixty per cent of the labor of building a ship is represented in the hull. The rest is expended in installing the machinery and equipment. American shipyards have set many new speed records during the last twelve months, but a few weeks ago a shipbuilding plant in Belfast, Ireland, wrested a laurel from the Yankees when the Irish workmen completed the installation of machinery in five working days from the time of a vessel's launching.

esque products of our national life, once conspicuous in numbers, long ago became conspicuous only because of his rarity, as our merchant marine practically disappeared from the seas. When, therefore, in the face of war's calamity we found ourselves a people without ships, we likewise found ourselves without men to operate the merchant vessels which we began with such frenzied haste to build.

It was not that the sons of the skippers and seamen, who in an earlier era of our history won world-wide fame manning our peerless barks and clippers, had grown soft and sybaritic. There was still in the youth of the land the brawn, the initiative, and the love of adventure which those must have who answer the call of the sea. But there had been no incentive to awaken the latent longing for strange places and for the romance of trackless waters and of combat with Nature's storms and lightnings, her spuming waves, and the ceaseless urge of her unseen currents.

To the Merchant Marine Recruiting Service, another of the coördinate branches of the United States Shipping Board, inaugurated by Henry Howard, of Boston, was entrusted the task of re-creating a noble race of mariners for the needs of the hour and for the merchant fleets which shall not disappear from the waters when peace comes again to the world.

While the recruiting service was tentatively organized in June, 1917, and at that time began training officers, it was not until February of this year that an active campaign began for training crews. Once under full headway, the work has been pursued with commendable success. More than 11,000 experienced men have been admitted to the schools for officers

and more than 28,000 inexperienced youths have been enrolled for training as merchant mariners. Seven thousand recruiting offices, located mainly in each unit of a great chain of drug stores whose chief executive has lent every possible assistance of time and fortune to the government, are supplying from 500 to 600 new students daily for the apprentice schools for seamen maintained on a fleet of 12 training ships.

SCHOOLS FOR SKIPPERS AND SEAMEN

More than 1,600 men are today attending the officers' schools, fitting themselves for the duties of mate, engineer, etc. In the navigation schools the course of instruction is six weeks; the engineers' course is completed in one month. But both schools require of their students previous navigation or engineering experience of two years at sea or its equivalent. That equivalent in the case of engineers may have been special training in technical schools, experience as a locomotive engineer, or engineer of a stationary engine.

The apprentice course is for six weeks, at the end of which time the successful pupil receives a rating as ordinary seaman and is placed on board a merchant ship. The ratio of apportionment in crews is not more than four graduates of the apprentice schools to every six able seamen, an able seaman being one who has followed the sea for two years or who has secured his advanced rating by passing an examination at the end of his first twelve months.

Like the pupil in the riveting classes of the shipyards, the apprentice receives a salary while he is fitting himself for important work—a stipend of $30 a month, plus quarters and food which would arouse the envy of every man who ever sailed before the mast in the old days of American supremacy at sea.

When the 288 hours of instruction have been completed (eight hours a day, six days a week, with one instructor for every ten men), the newly created sailor, cook, steward, oiler, coal-passer, or water-tender—whichever branch he has chosen—begins work at from $60 to $75 a month, with 50 per cent additional should he be sent into the war zone.

In order to be enrolled in an officers' or an apprentice school, the applicant must pass a thorough physical examination and must be an American citizen.

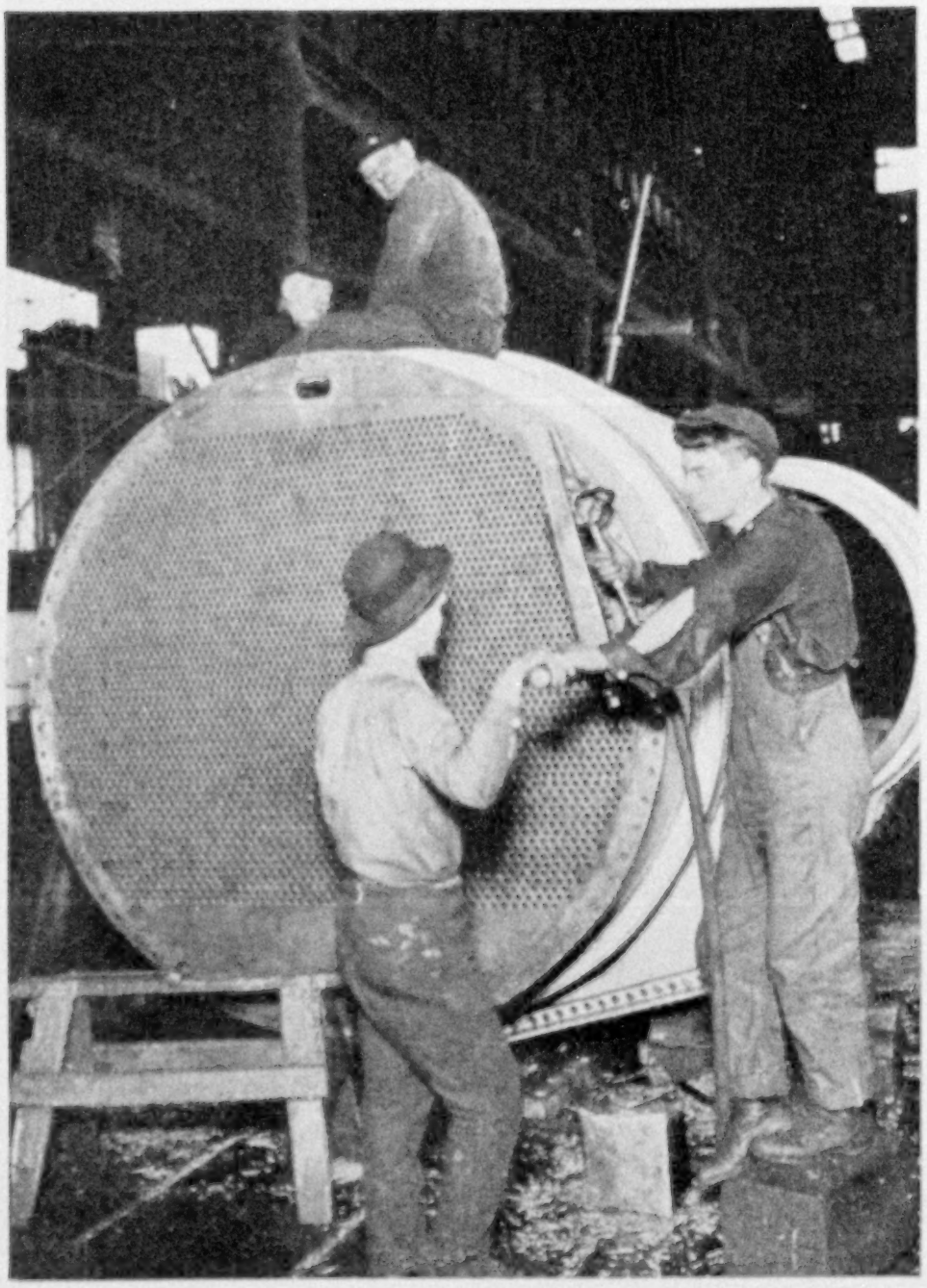
The strength of the personnel of the merchant marine at the present time is in the neighborhood of 75,000. If the war ends in 1920 and we have by then a merchant fleet of 3,500 ships, as is now the reasonable prospect, we shall need an additional 100,000 men, besides the number which must be recruited as replacement crews to take the places of those men who will return to shore life at the end of the war.

THE REMAINING MAJOR TASK

Having mobilized and trained the necessary man power for the task of building a vast merchant fleet; having provided the workmen with satisfactory surroundings and with the material which goes into the making of those ships; having begun to launch and fit out the ships themselves with something approaching quantity production; having organized machinery for the recruiting and schooling of officers and crews to man those ships, and having actually developed an appreciable number of such officers and seamen, the remaining major task of the United States Shipping Board lay in the direction of expanding the facilities of our ports and harbors in order to eliminate the woeful congestion which existed and still exists, and which would have become still worse as the number of ships increased.

James J. Hill, that great phrase-maker of commercial life, once defined a seaport as the funnel through which a country's commerce flows, and added the truism that the volume of traffic which a line can carry (be it a railway line or a steamship line) cannot exceed the capacity of its terminals.

Every one admits today that the conditions, both at our own chief seaports and in France, at the time American troops first landed Over There were "pretty bad." It may be that there was some exaggeration in the story that the great freighter *Nansemond*, formerly the German ship *Pennsylvania*, a cargo-carrier of 15,000 tons, lay alongside a dock at Brest for three weeks and then had to



© Committee on Public Information

A MARINE CONDENSER WITH 4,000 SMALL BRONZE TUBES THROUGH WHICH COLD WATER IS PUMPED

The 7,500-ton fabricated steel ship is expected to make a speed of 11½ knots an hour, while the 3,500-ton wooden ship of the Ferris type has engines which send it through the seas at a speed of 10 knots. The shaft horsepower of the engines in the steel vessel is 2,500, while the indicated horsepower of the latter is 1,400.

return to America with two-thirds of her cargo of steel rails (urgently needed for the construction of communication lines to the American base camp) still in her hold. But even so, no one will attempt to deny that "confusion worse confounded" was a mild term to describe terminal conditions in the summer and fall of 1917.

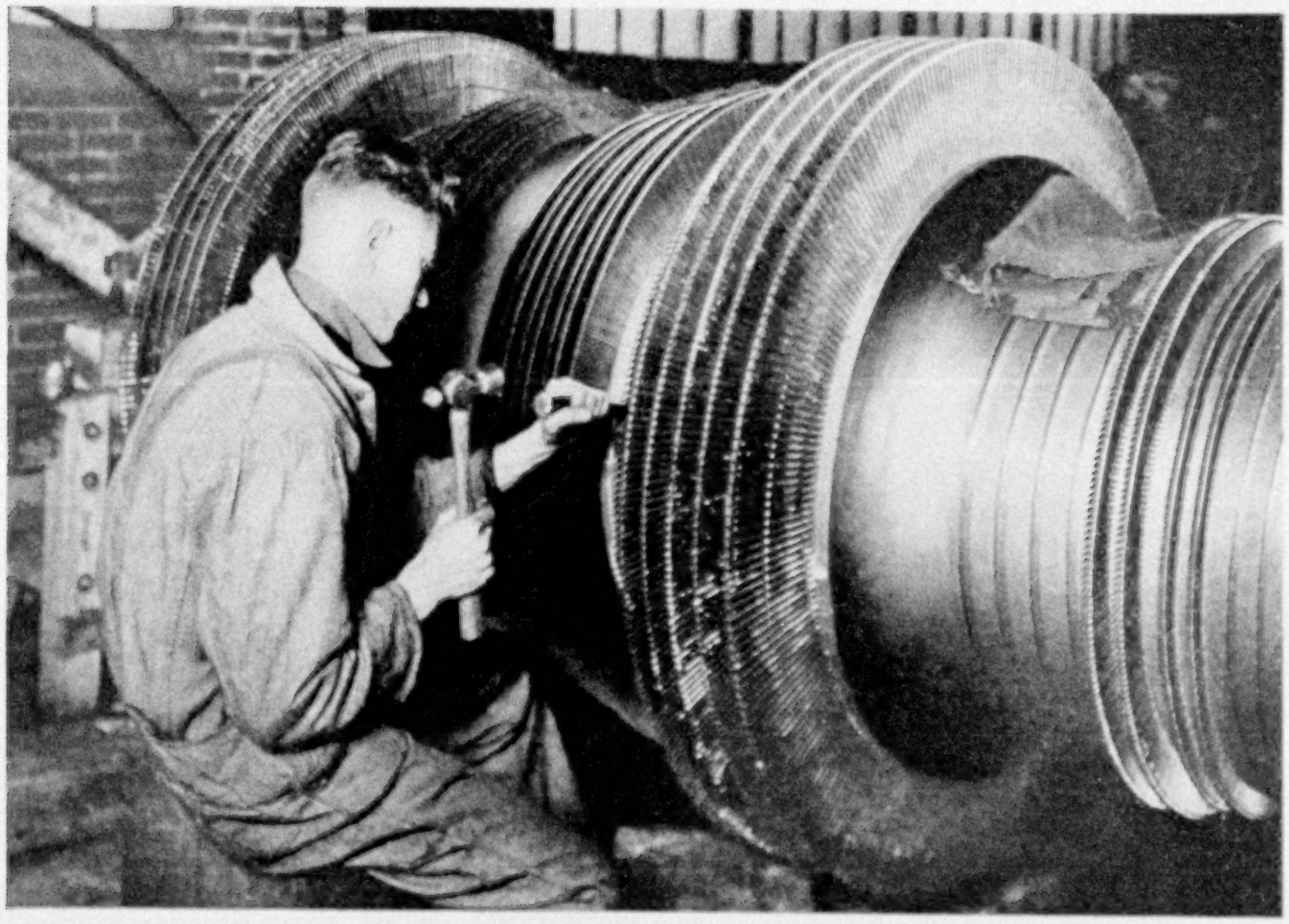
Through the indefatigable efforts of various branches of the army, the congested condition in the French ports of debarkation were effectually remedied, but there still remain many things to be done before our ships can be utilized to their maximum efficiency.

To expedite the correction of existing shortcomings, and to make ready for that new merchant fleet of millions of tons capacity, President Wilson suggested a conference among officials of the Shipping Board, the War Department, and the Railroad Administration. As the outcome of that conference, the Shipping Board, on May 23 of this year, created a Port and Harbor Facilities Commission.

A NOTEWORTHY COMMISSION

The reading public, through many channels of publicity, is fairly familiar with the work of the Shipping Board under the chairmanship of Edward N. Hurley; it knows of the achievements of Charles M. Schwab, Director General, and of Charles Piez, Vice-President and General Manager of the Emergency Fleet Corporation; it is conversant with the activities of Henry Howard, who directs the Merchant Marine Recruiting Service, but thus far the opportunities, difficulties, and lasting importance of the Port and Harbor Facilities Commission have been strangely overlooked by the American press.

The personnel of the Commission itself



© Committee on Public Information

STRAIGHTENING THE MINUTE BLADES ON THE SHAFT OF A TURBINE ENGINE

The first turbine-driven vessel ever built was the *Turbinia*, which developed a speed of 34½ knots an hour on its trial trip in the spring of 1897. Today most of the high-speed merchant and naval craft of Great Britain and the United States are equipped with turbines.

suggests the ramified interests which it affects. E. F. Carry, until recently director of operations of the Shipping Board, is the chairman; Vice-Chairman S. M. Felton represents the War Department's interests; Rear Admiral H. H. Rousseau is spokesman for the Emergency Fleet Corporation; the navy is represented by Captain A. C. Hodgson; J. H. Rosseter speaks for the Division of Operations of the Shipping Board and Pacific Coast steamship interests, T. C. Powell for the United States Railway Administration, and G. S. Dearborn for the Atlantic Coast steamship interests, while E. Logan Hill, formerly assistant general manager of the Erie Railroad, is the dynamic secretary of the Commission and F. T. Chambers, U. S. Navy, is its chief engineer.

The task which lies before the Commission is Herculean. It must devise ways and means to enable our ports to handle an unimagined volume of war material, foodstuffs, and troops in less time than man ever before attempted such a feat.

The speed with which ships can be loaded and bunkered on this side, unloaded Over There, and started back for another cargo is the supremely vital factor in the maintenance of the three-tons per fighting man ratio. Any slackening of pace necessarily means additional tonnage, for a ship that makes a round trip between New York and Bordeaux or Brest in six weeks is exactly one-half as valuable as the ship of the same tonnage which can make the "turn-around" in three weeks.

The price which a rapidly growing seaport pays for its prosperity is the development of its shipping facilities along lines of transitory expediency rather than those of lasting and economical expansion. New York presents a flagrant example

of a city whose commerce has grown so rapidly as to outrun the imagination of its builders. Hence a congestion at railway terminals and at docks which defies immediate solution.

The Port and Harbor Facilities Commission has found it wise to begin surveys of ports all along the Atlantic, Gulf, and Pacific seaboards, to determine how and where best to divert a part of our commerce from New York Harbor.

These surveys embrace a vast deal of data. Not only is it essential to know the amount of commerce which has passed through a given port in time of peace, but what are its possibilities with respect to railway connections, the labor situation, the productivity of the adjacent territory; what amount and kind of imports can be absorbed in the neighboring States, as well as the kind of exports which can be handled most expeditiously and economically. It is obviously impractical to ship cotton from Boston or New York when it can be shipped from Savannah, Ga., the doorway of the cotton fields; but it is equally impractical to bring the cotton cargo-carrier into Savannah to discharge imports from Liverpool destined for New England consumption.

Likewise, it is a waste of time and labor to route all our coffee imports either through New Orleans or New York. The logical scheme would be to bring into New Orleans that portion of the Brazil crop which is consumed in the South and West, and that portion destined for the North and East through New York. These are typical elementary problems which the Commission considers in its surveys. Their number is legion.

One of the most important phases of the Commission's labors is to make provision for the proper and expeditious coaling of ships and for their prompt and thorough repair. A number of contracts have been let for the construction of dry docks, and financial assistance is being accorded private firms for the erection of wharves, piers, warehouses, improved machinery for bunkering, and for the installation of cranes and other modern loading and unloading devices. Repair yards are being built in several ports, and the plans for these are carefully scrutinized by the Commission's engineering experts, in order to insure adequate facilities for the new commerce carriers.

No part of the shipping program is fraught with greater possibilities for constructive accomplishment than that entrusted to the Port and Harbor Facilities Commission.

SPEED AND ECONOMY IN HANDLING FREIGHT

The economic waste which results from the improper handling of freight at terminals is appalling. The opportunity for improvement of conditions is demonstrated by the fact that the average cost of hauling a ton of freight for a distance of 240 miles in the United States is 74 cents, while the expense of handling that same freight at the terminals is 75 cents. Goods once loaded may be transported from Havana, Cuba, to Boston, a distance of more than 1,300 miles, cheaper than they can be moved from one pier to another in that city. And it has been estimated that a cargo of coal, after it has been loaded on board ship, can be moved from New York to Rio de Janeiro for less than it can be moved a distance of 60 feet on the docks by ordinary methods.

That the task of loading and unloading a ship can be developed to a science by the employment of highly specialized machinery and the use of docks specially built for specific kinds of cargoes has been demonstrated on the Great Lakes, where iron ore which formerly was hoisted from a ship's hold and moved to the ore pile for 50 cents a ton is now handled at less than one-tenth that cost.

Gratifying progress has been made in the rapidity with which our ships are being dispatched abroad, and the improvement is continuing. Two ships are now doing the work which it required three to do a few months ago. The procession of cargo-carriers in and out of our harbors reminds one of a never-ending merchant marine review. Every six minutes a merchant ship arrives and another departs from American ports. Sailings for Europe are even bettering that famous railway advertising slogan, "A train every hour on the hour;" a Europe-bound vessel departs every 40 minutes. These

© Committee on Public Information

FINISHING THE BOW PLATES OF A MODERN FREIGHTER

One of the vexatious questions which has greatly perplexed the directors of the shipbuilding programs in Great Britain and the United States has been the problem of "overtime." Many industrial relations experts maintain that the payment of time-and-a-half or double-time for Sunday labor is one of the chief causes for absenteeism in the shipyards. The temptation is strong to work on Sundays and lay off a day during the week, thus securing seven days' pay for six days' work. Both from the standpoint of output and of the workmen's health, the seven-day week is being frowned upon in many quarters.

40-minute sailings do not include ships in the service of the army and navy.

In the new order of the day, there is no such thing as a loafing speed on any sea. Formerly, nitrate ships bearing that essential ingredient of explosives from Chilean ports to New York made four voyages a year; now the "turn around" between New York and Iquique is made in 44 days, while the trip from New York to Valparaiso has been made in 18 days. The round-trip voyage between Rio and New York, for ships bearing manganese for the manufacture of steel formerly averaged from three to four months; a Swedish vessel under charter to the Shipping Board has made it recently in 55 days. Ships bringing oil from Tampico to Galveston now average 11 days for the round trip, while some tankers occasionally make it in a week. Sisal is being brought from Yucatan in ships that make the turn around in two weeks. Out in the Pacific the round trip from San Francisco to China, including time in port, has been reduced to 81 days, while from Seattle to Japan and return is made regularly now in 68 days.

These speeding-up records are an earnest of what can and will be done when our ports and harbors are adequately equipped and when the faster and larger cargo-carriers are put into service.

AFTER THE WAR

All America recognizes the fact that the chief end of our ships is to safeguard democracy and enable us to enjoy it forever. But there are secondary ends also, and the foremost of these is the restora-

tion of our country to an honored place among the maritime nations of the world after peace has been declared.

No people living unto itself alone has ever been truly great. Commerce has been the world's greatest civilizing influence, and it has frequently happened that wealth and power and the opportunity to serve mankind have been entrusted to nations whose territorial dominions were inconsequent and whose peoples were numerically puny. Their influence was based on the universality of their knowledge of men and climes.

The Phœnicians, greatest merchants of antiquity, wrote their names large and indelibly in the chronicles of the ages, not through the virtue of their statesmen, not through the courage and strategy of their military captains, not through gifts of art, of religion, or of literature, but because from their ports of Tyre and Sidon they set sail on every sea, bringing the raw riches of mines and forests from the outer fringes of the world to Greece, to Egypt, and to the islands of the Mediterranean; because they carried their purples and linens to the princes and potentates of Rome, of Sicily, of Carthage, and to mysterious lands, gardens of the Hesperides, lying beyond the Pillars of Hercules; because they were the great disseminators of the culture of the East through their superior knowledge of the earth's geography, and because they could sail the trackless sea better than any other race of their time.

After the Phœnicians, the next country to establish her unquestioned supremacy on the seas was the great mother of civilization, Italy, whose mariners carried to the ends of the earth the fame of her marvelous city republics, Venice and Genoa. The wealth and power of these great capitals of commerce were founded solely upon ships. Then, as mutual rivalries undermined their world sway, and the discovery of a water route to the Far East brought England and western Europe into communication with the Orient, their prestige waned, and gradually there arose in northern Europe that remarkable maritime association known throughout the middle ages as the Hanseatic League—not a nation, but a world power whose units were bound together by common interests of commerce.

The successive rise and decline of Portugal, Spain, and the Dutch Republic, world powers whose supremacy, one after the other, was founded upon maritime prowess, are familiar to all students of human history.

CIVILIZATION'S DEBT TO BRITAIN

Then came the British Empire, the mother of colonies, whose sway upon the Seven Seas has been maintained for more than two centuries.

British command of the high seas, more than any other instrumentality of modern times, has resulted in the dissemination of light into the dark places of the earth. The Anglo-Saxon has spread his influence on every continent and over the islands of every sea by benevolent assimilation of alien peoples. This enduring sway of British influence, maintained by a girdle of commerce-bearing steel ships, furnishes an illuminating contrast to the ephemeral empire of Alexander, held together solely through the force of fear engendered by the Macedonian phalanx.

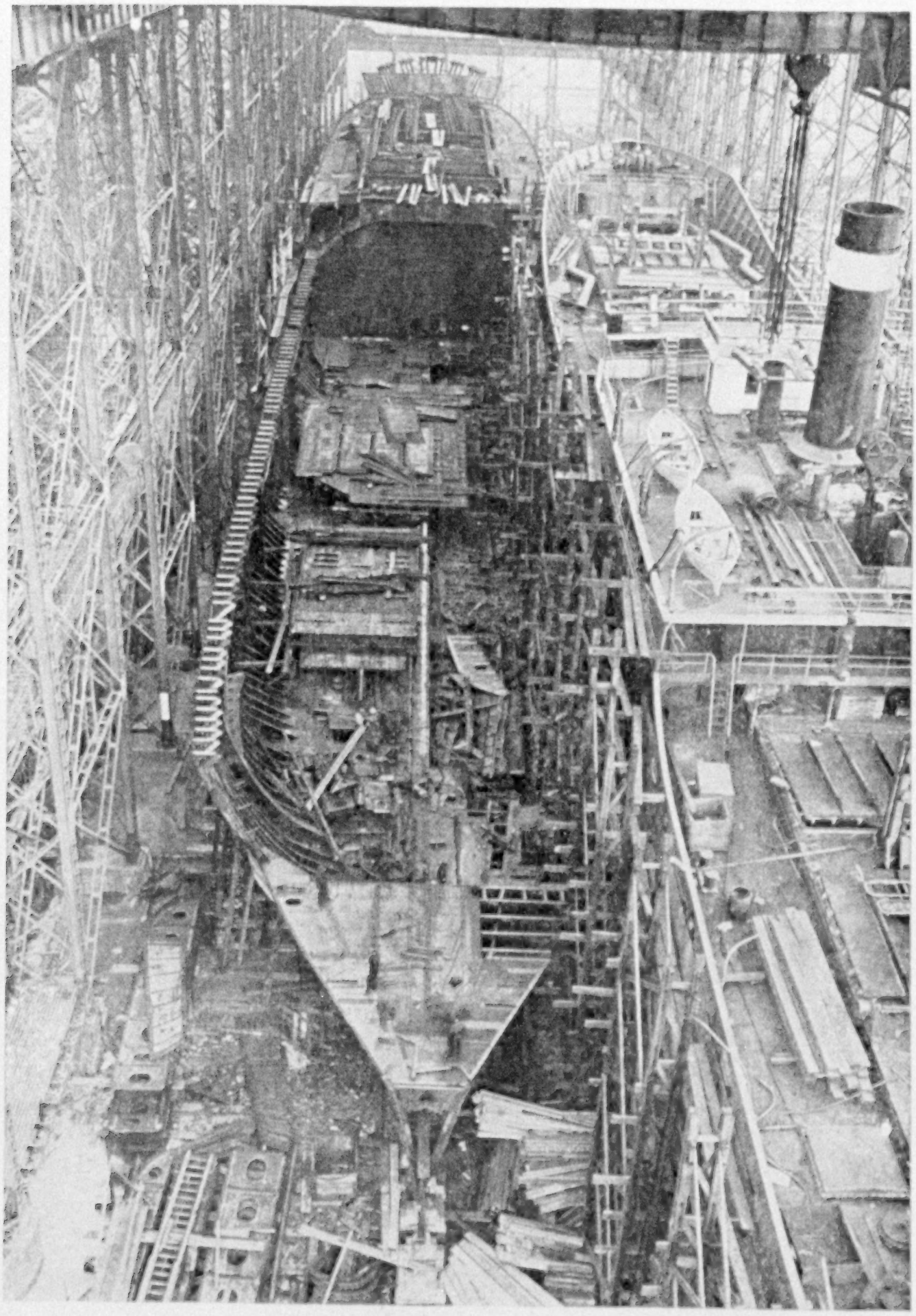
A hundred years ago America gave promise of sharing honors with the parent nation, but a combination of circumstances caused the young Republic of the West to withdraw from enterprises for which her mariners and her wonderful shipbuilders had proved her to be so fit.

From 1793 to 1842 more than four-fifths of all the imports and exports of the United States were carried in American bottoms; from 1843 to 1862 the proportion declined to three-fourths. The next quarter century saw it diminish to one-fourth, and finally to only a little more than one-tenth, from 1887 to 1913.

Now, with our shipyards turning out steel ships, wooden ships, and concrete ships, the auguries seem propitious for that not-distant day when, with all the world at peace, the Union Jack and the Stars and Stripes shall float side by side in all the ports on earth and contend in brotherly rivalry for supremacy of speed on every sea. Then will there be an Anglo-Saxon partnership in commercial ventures against which Teutonic aspiration can never raise its bruised head in menace.

In the meantime, to thwart the common enemy of mankind on land, America will continue to build ships, ships, ships!

XUM



Photograph by Paul Thompson

BUILDING SHIPS IN PAIRS

Ships are costing three or four times as much today as in pre-war times, but they are being built six or eight times as fast, and speed is the essential factor just now

A PART OF THE 860-ACRE TRACT OF SWAMP AND BOG, PURCHASED AT $2,000 AN ACRE, UPON WHICH THE $35,000,000 HOG ISLAND SHIPBUILDING PLANT HAS BEEN BUILT

On this spot, where formerly the song of the mosquito was the only sound to greet the ear of the surveyor or the fisherman, there is today the rattle of a thousand rivet guns building a fleet of 180 fabricated ships that will make a line of vessels, steaming a ship's length apart, more than 27 miles long.

THE AMERICAN PEOPLE MUST BECOME SHIP-MINDED

By Edward N. Hurley

Chairman, United States Shipping Board

THE Germans used to complain, before the war, that only a small proportion of the American tourists who visited Europe each summer filtered through to their country. England, France, Belgium, Holland, and Italy got the heavy battalions of the American tourist army. The Germans felt neglected, especially as many of our tourists traveled in their big liners. Berlin even undertook to overcome the handicap of distance by organized attractions designed to make it a rival of Paris. But the percentage of real American tourist travel to Germany was small—most Americans who crossed the Rhine went for purposes of study or business.

During the past summer, however, this situation has entirely changed!

We have sent abroad in three months a number of "tourists" greater than the entire eastbound passenger travel for an average pre-war year—that is, the total eastbound passenger traffic in 1913 over the North Atlantic routes was 718,373, while this summer 300,000 American *soldiers* have been ferried over the Atlantic in one month. Many of them went in the big German liners, now used as transports by Uncle Sam. Some of them landed in England, others in France, the old tourist points; but every one of them was dominated by the desire to cross the Rhine and visit Germany and interview the Kaiser in Berlin!

Which goes to show, perhaps, that there is always some method of getting things started your way.

BRITAIN, FRANCE, AND ITALY AIDED IN TRANSPORT OF TROOPS

We could never have carried out the big job of transporting troops and supplies to Europe without the help of Great Britain and her Allies. During the past summer, at times of maximum troop movements abroad, British ships have carried as high as 80 per cent of our soldiers, while more than 50 per cent are now going across in British vessels. Aid has also been furnished us by France and Italy. On September 1 of this year the United States Shipping Board controlled nearly 10,000,000 dead-weight tons of merchant ships, comprising seized enemy ships, requisitioned and chartered foreign ships, old American ships pressed into service, and new ships owned by the United States Shipping Board.

THE DIFFICULTIES OF OPERATING OUR MOTLEY FLEET

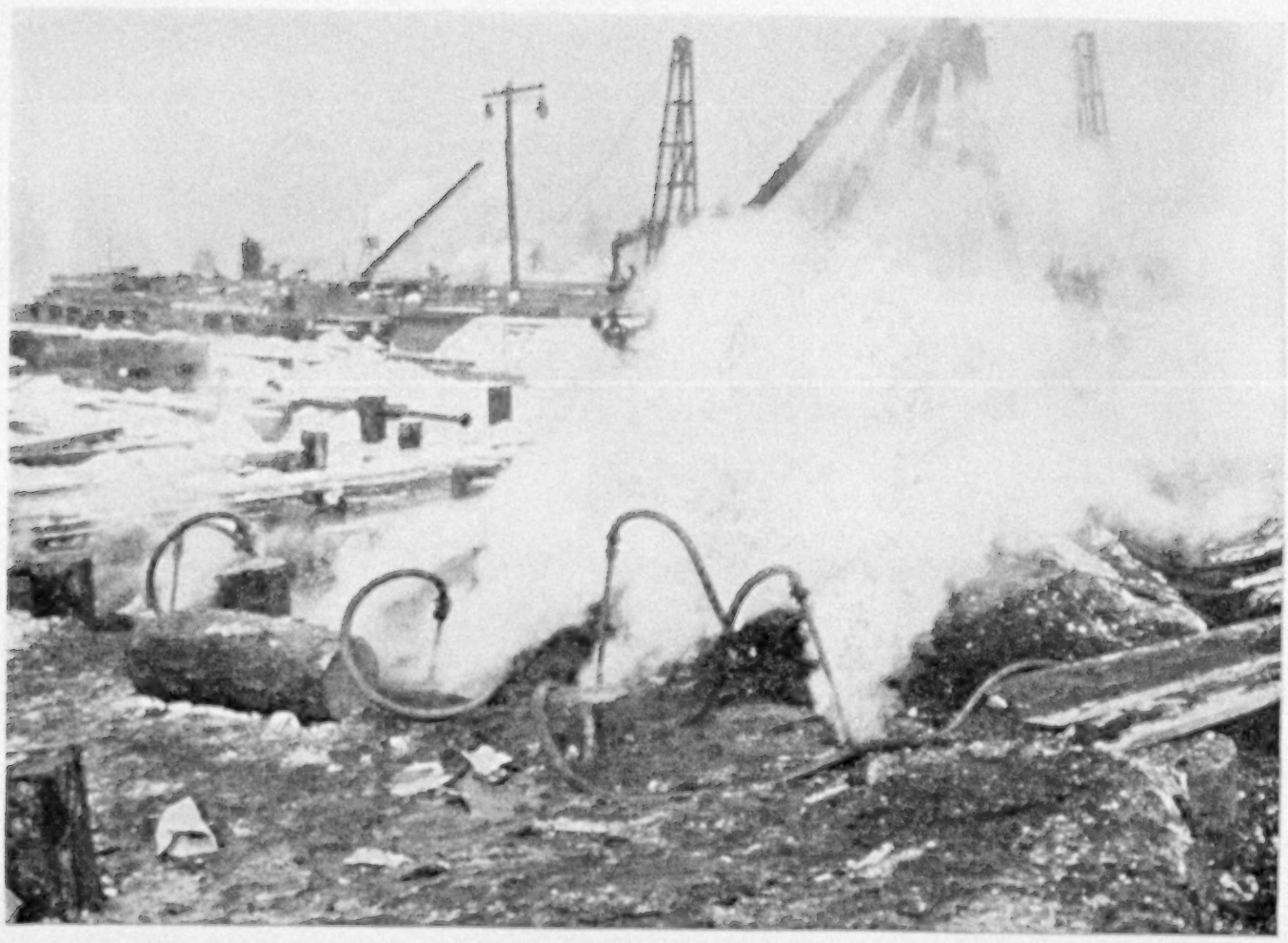
It is a great Armada, this army supply train to France, for it is almost double the whole German merchant marine at the outbreak of the war. But it is also rather a motley collection of bottoms—old ships and new, big ships and little, the Leviathan and the ocean tramp, the steel tanker and the wooden coaster. Moreover, it is operated under difficulties that have probably never confronted any other nation. We have had to train merchant officers and seamen. There have been complications in loading and unloading, both on this side and abroad, due to the diversity of cargo handled and emergency pressure put upon port facilities. Our Armada, being made up of diverse sizes and speeds, has not lent itself to standard operation. Finally there has been the very definite handicap of convoy traffic, which pulls ships down to moderate speeds, lengthens the average voyage while at sea, and hinders turn-around at the ports, because convoyed ships must wait their place, regardless of efficiency in loading or unloading.

We are doing the job assigned us today with the help of the British, French, and Italians, and when one remembers that the American military force has been multiplied by five this year, with a cor-

XUM

A SCENE AT HOG ISLAND WHEN SNOW AND ICE PRESENTED ALMOST INSUPERABLE HANDICAPS TO THE CONSTRUCTION OF 50 SHIPWAYS

But work progressed throughout the severest winter in the history of Pennsylvania, and today this is the site of a shipbuilding plant employing 30,000 men. The ships which this yard is expected to produce under a contract with the United States Government will cost $230,000,000—two and a half times the value of all the gold mined in the United States in 1916.



BEFORE IT WAS POSSIBLE TO PROCEED WITH EXCAVATION WORK AT HOG ISLAND LAST WINTER, IT WAS NECESSARY TO THAW THE GROUND WITH LIVE STEAM

At any other time and in almost any other place it would have been logical to wait for the weather to moderate, but with the Huns marshaling their forces preparatory to launching their great spring drive, all America was spurred to the limit of its capabilities in hurrying the construction of a great cargo and transport fleet.

responding multiplication in the demand for tonnage, perhaps we have reason to feel that we are doing more than we anticipated when the original war shipbuilding program was laid down.

But tomorrow we will do better.

THE COST OF SHIPBUILDING AFTER THE WAR

Now that new, modern steel steamers are being delivered to the Shipping Board, it is possible to look ahead a year and see increased efficiency in our ocean supply service. We shall have big transports running at good speeds, with beef ships, tank ships, and steel freighters. A large proportion of these vessels will be oil-burning, with turbines, comfortable quarters for crews, and other improvements. It will then be possible to standardize operation and increase turn-around at ports, serving the American soldier in France with less tonnage.

Cost of building ships in American yards after the war should compare favorably with costs in other countries. We shall have great yards for fabricated ships and quantity production. These will put the industry on a sound footing, an entirely new basis, and we shall do on the ocean what we are already doing on the Great Lakes—build and operate ships more economically than any other nation in the world. Moreover, we will have enough shipbuilding business so that all our yards can specialize on one or two classes of ships, as is done abroad.

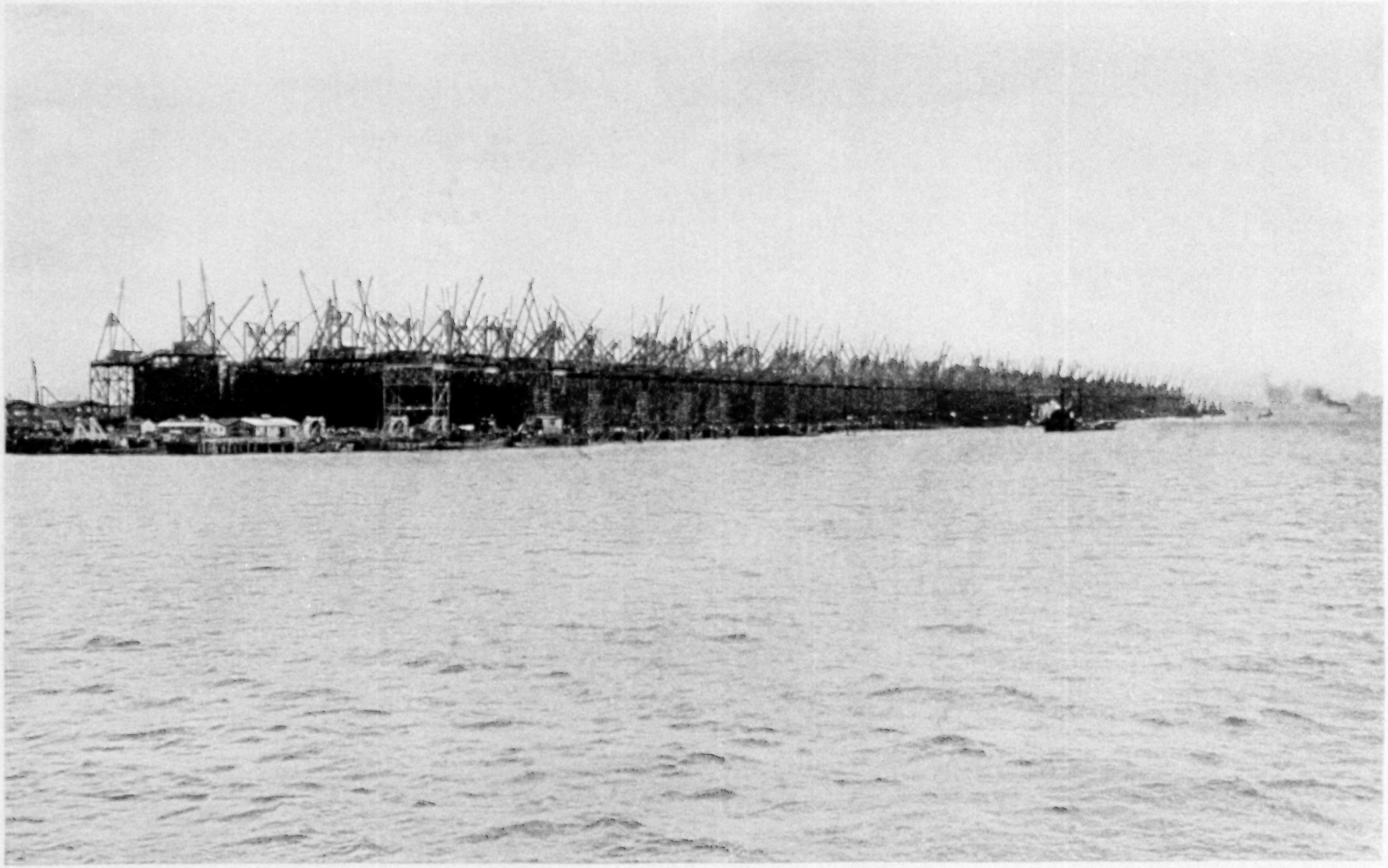
In the past our few merchant shipyards built almost anything that was ordered, from a tug to a floating dry-dock. That was a fundamental handicap in cost, due to our small volume of shipbuilding.

XUM

OVERLOOKING HOG ISLAND AFTER THE WORK OF CONSTRUCTION WAS FULLY LAUNCHED

There are almost enough miles of railway within the limits of this shipyard to construct a double track between Washington and Baltimore

XUM



THE 50 SHIPWAYS AT HOG ISLAND, EXTENDING A MILE AND A HALF ALONG THE WATERFRONT

It will require 70,000 freight cars—a train 550 miles long—to convey the material which will enter into the construction of the 180 ships to be built for the United States Shipping Board at this gigantic shipyard

THE WOODEN BARRACKS FOR WORKMEN AT HOG ISLAND RESEMBLE THOSE OF AN ARMY CANTONMENT

At no other shipyard was the housing problem so serious as at Hog Island, owing, primarily, to the fact that the plant was located on an inaccessible site some miles outside of Philadelphia. Railway and street-car lines had to be built before any large group of men could be set to work erecting temporary living quarters.

With a real merchant marine demanding several million tons of new shipping yearly for growth and replacement, the situation will be entirely different—we will stop tinkering and jobbing and begin *manufacturing* ships.

OUR MERCHANT MARINE MUST BE WORTHY OF INDUSTRIAL AMERICA

Our supply ships today, despite the remarkable way in which they are meeting the war emergency, are nevertheless a reproach to us for past neglect of ocean transportation. And when our new ships materialize and are placed in service, embodying modern features of design, they will represent America's correction of past neglect and point a way to a merchant marine worthy of our national efficiency in other industries.

When our present shipbuilding program has been carried out we will have a merchant marine of the first order, so far as physical equipment is concerned. The present building program is laid out to cover about two years. It calls for more than 16,000,000 dead-weight tons of new construction, comprising 2,249 contract ships, 42 concrete ships, and 402 requisitioned ships.

The transports can be converted into passenger-and-cargo liners, running on regular routes between this country and Latin America, Europe, the British colonies, and the Orient. Fast cargo ships, refrigerating ships, and tankers will be assigned to regular freight routes. Tramp cargo-carriers will take their place in the charter ocean traffic.

AMERICA'S FACILITIES ON THE OCEAN AFTER THE WAR

America will have facilities on the ocean for delivering her factory and farm products, bringing home raw materials from other countries, carrying her customers to her doors, and, what I consider to be even more important, taking Americans abroad as tourists and salesmen and students and creators of international good will, especially to Latin America.

It is generally thought that we are handicapped in the operation of ships by higher American wages paid officers and seamen and obsolete navigation laws. Actually, our real handicaps have been lack of a large merchant marine covering American trade routes regularly, to give us the benefit of quantity handling, and lack of modern port facilities to give us quick turn-around.

In our other industries we have demonstrated it as a principle that the way to cut costs was not to cut wages, but to increase the volume and the efficiency. War is giving us a big merchant marine—a basis for American inventiveness and energy to work upon, developing new methods.

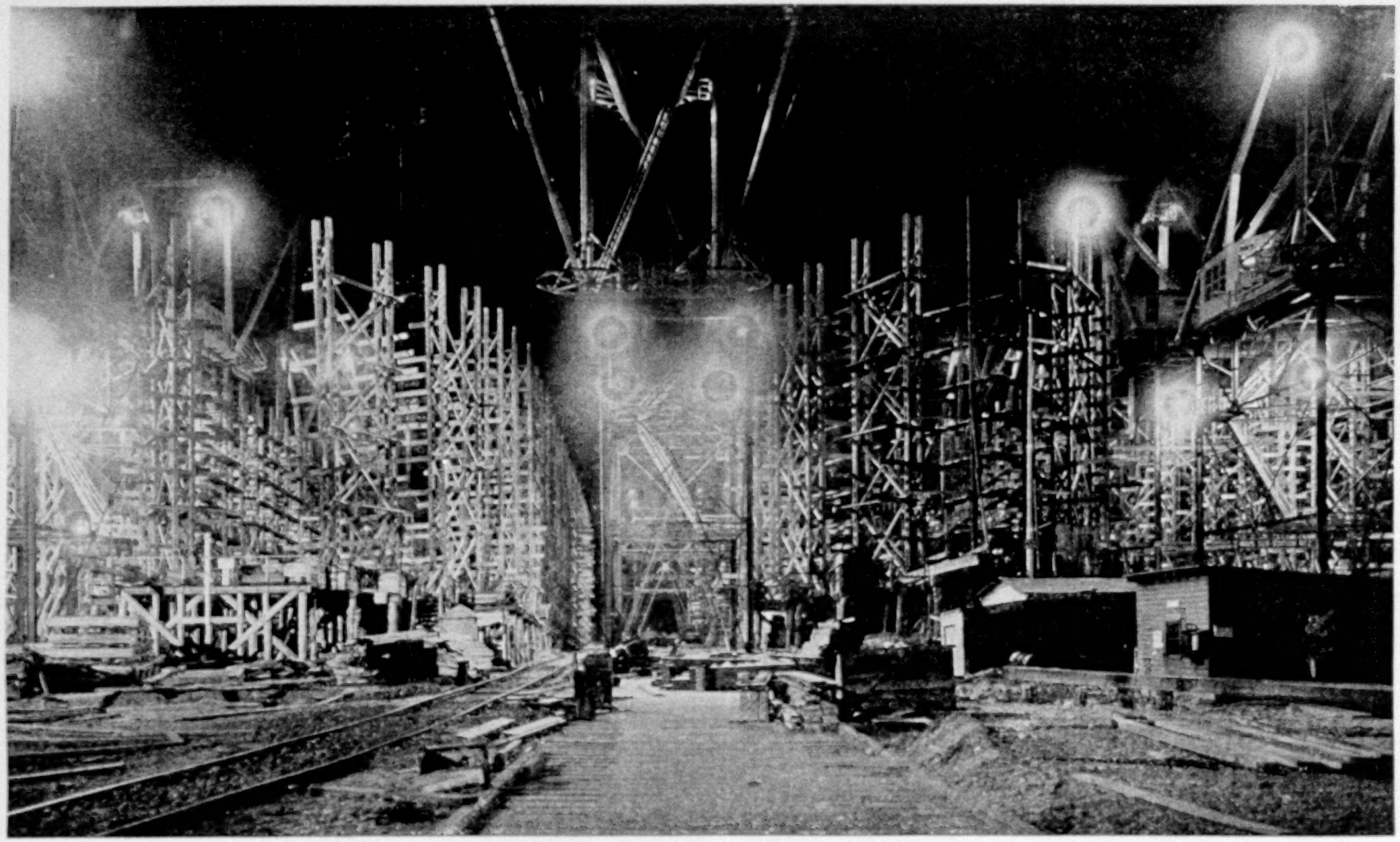
We have the best-developed petroleum industry in the world, and will increase the tonnage handled per man in ocean transportation, as well as reduce costs and eliminate much of the uncongenial work aboard ship, by building vessels equipped to burn oil either under steam-boilers or in explosion engines. Moreover, we can keep our ships at sea as many days in the year as possible, and eliminate costly waiting in port by rebuilding our ocean terminals, linking them up to our railroads, and turning our ships around in a matter of hours instead of days, just as we do with our big carriers on the Great Lakes.

AMERICA MUST BECOME SHIP-MINDED TO WIN MARITIME POWER

But it takes something more than physical equipment to make a merchant marine. We must have technical training and morale, if you please. We must make America ship-minded. We are so little ship-minded today that it is chiefly the difficulties of operation which occupy the thoughts of those who are giving any thought whatever to our merchant marine of tomorrow.

Our people still think of ships and foreign trade with fear and doubt, contrasting ourselves with the more efficient maritime nations.

Their thought of ships today is approximately what their thought of war was a year ago, when we were passing through the difficulties and gloom of preparation. These were dark months, and it seemed as though we should never get anywhere in stemming the advance of the Hun. But we know what happened at Chateau-Thierry, when two divisions of the new American Army not only stopped several



NIGHT SCENE ON THE WAYS OF THE HOG ISLAND SHIPYARD

In order that work may proceed night and day, the electric-lighting system is most elaborate. The electric-power plant is large enough to supply the needs of a city the size of Seattle.

divisions of crack Prussians, but sent an electric thrill of hope and youth and the fighting spirit through the war-worn Allies. That was an achievement, not of numbers, or equipment, or advantage of any kind, but purely of morale.

And in thinking of the American merchant marine as it will be tomorrow, I feel confident that we will back up our ships with something of the same spiritual quality. There may be difficulties and limitations we do not yet know. But I believe the American way of overcoming them will be to exert our national genius for invention and organization, holding our own through the development of new methods.

SHIPBUILDING COMPARED WITH THE AUTOMOBILE INDUSTRY

Fifteen months' experience as Chairman of the United States Shipping Board has made me somewhat wary of prophecy. Yet I feel safe in predicting that a year from now, provided we give the necessary thought to this great question of the merchant marine, we shall have as great confidence in its efficiency and its future as we have today in our army abroad.

Comparisons between the American automobile industry and our new merchant marine are natural. We are building our fabricated ships on the standardized quantity production plan, like American automobiles. Our automobile industry has become what it is, first, through the average American family's need for an automobile and the ability to buy it; and, second, the splendid spirit of the industry. The average American producer needs ocean transportation just as much, and it is reasonable to assume that when the need is realized we will generate a merchant marine spirit comparable with the automobile spirit.

SKILL AND TRAINING ESSENTIAL IN OUR MERCHANT MARINE SERVICE

Given the ships and the merchant-marine spirit, only one other element is needed—that of technical training in shipping and foreign trade.

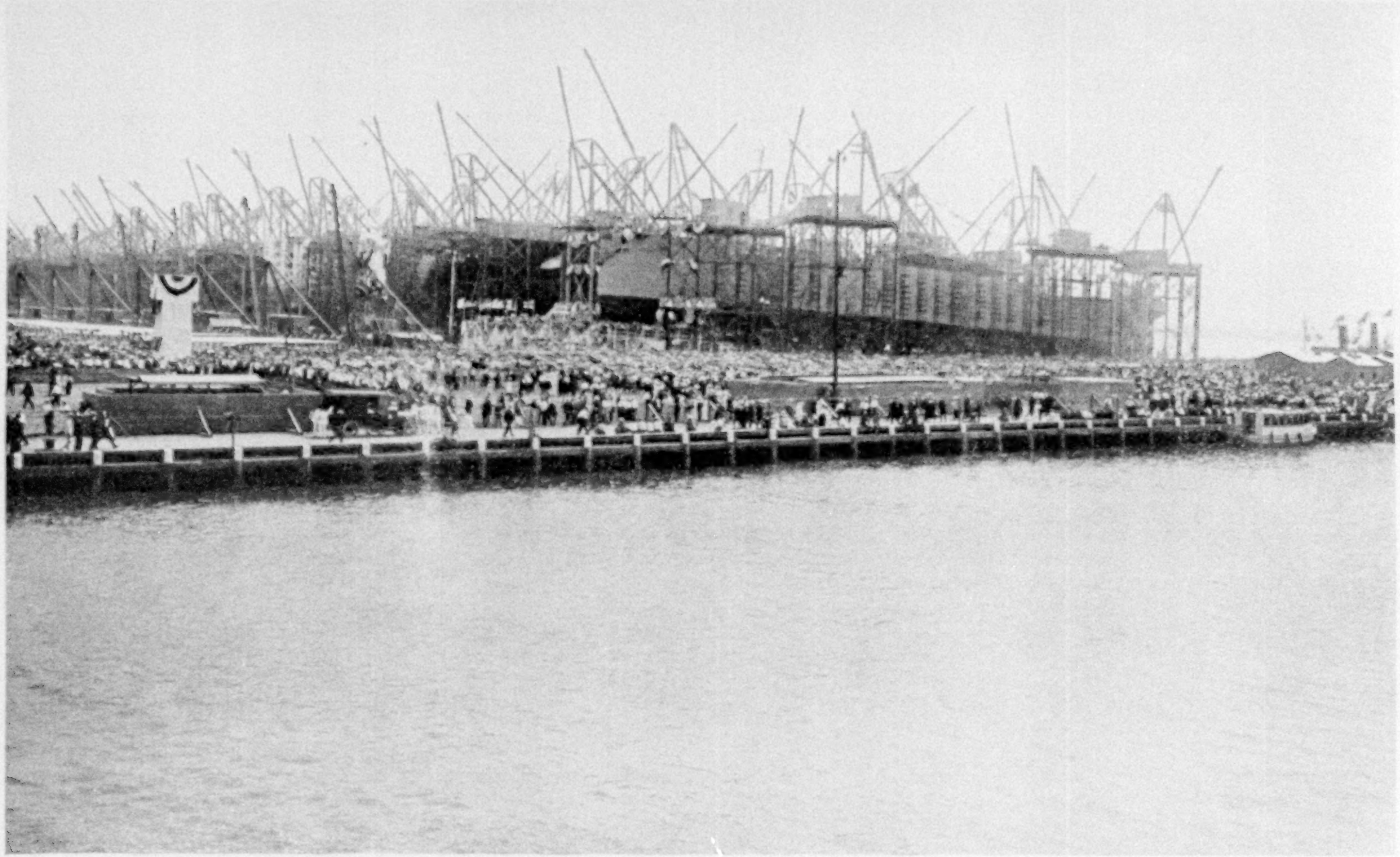
People think of seafaring men as more or less unskilled laborers. They admit that the old-time salt on a sailing ship was a man of many trades, knowing how to knot, splice, reef, and steer; but they have heard that the modern tramp steamer requires chiefly deckhands and coal-passers.

Nothing could be further from the truth. The men who man and command modern steel ships are divided into three classes—deck department, engine-room, and steward service. Deck duties call for skill in navigation and lead to posts of highest command. The engine-room of a modern steel steamer carries possibilities for learning a half dozen trades; it has boilers, engines, dynamos, motors, lighting, refrigeration, machine-shop work, and so forth. Even the steward's department on a passenger liner calls for knowledge and skill comparable with that needed for running a modern hotel. So, in the operation of ships, we find a whole bundle of interesting technical crafts, with possibilities of rising in the merchant marine or fitting one's self for opportunities ashore.

TRAINED MEN REQUIRED ASHORE AS WELL AS AFLOAT

And this is only a beginning in the technicalities connected with shipping. Ships are loaded and unloaded at our ports. That calls for dock management—warehousing, conveying machinery, stevedoring—all technical in their nature. Ships must be insured and cleared, cargoes must be routed, with shipping and ship's papers—the documents connected with ships are many and technical. Freight must be organized and assembled for quick handling on regular routes covered by schedule. If ships are to make money, that calls for skillful handling of outgoing freight in this country and expert selling and service in foreign ports. In fact, there is another compact bundle of technical crafts connected with the merchant marine ashore, at home and abroad, and beyond these crafts again we find the foreign branches of American exporters and manufacturers and banks.

Even to man our emergency supply ships to France we have been compelled to recruit and train officers and seamen at the rate of several thousand weekly. Unless we can train men and have them ready for the American merchant marine



Photograph from U. S. Shipping Board

LOOKING EAST FROM PIER A AT HOG ISLAND

The crowd has assembled to witness the launching of the *Quistconck*, christened by Mrs. Woodrow Wilson. The decorated prow of the vessel about to be launched is seen in the middle distance.

in its broadest aspects, ashore as well as afloat, it will be necessary to depend upon foreigners with the requisite experience. Therefore, we are taking steps to establish vocational and college courses throughout the nation. There will be courses in specific trades suited to men already at work in shipping offices, and on docks and railroads, fitting them through concentrated night study for advancement in their present positions. And there will be college courses for men who wish to prepare for ship operation, port management, foreign trade, consulships, and the like.

So, out of our present ocean supply train for the army abroad, there are growing many possibilities and opportunities.

CREDITABLE PROGRESS IN THE FACE OF GREAT DIFFICULTIES

Looking back twelve months to the time when we faced the task of building 150 new shipyards for merchant tonnage, and when only two complete new ships had been delivered to the Shipping Board, I feel that we have not only made creditable progress against overwhelming difficulties, but that the thought of the nation has followed us, and made even greater progress in the building of sound public opinion.

Looking ahead to the coming year, I feel that we shall make even greater progress in ship operation and the development of a real merchant marine. It is logical to assume that the quick war-time intelligence of the nation will keep pace with us during the coming months, and that a year hence, when the American merchant marine is a physical actuality, there will be a backing of national public opinion equal to the support of our ships, their profitable operation, the making of any adjustment in laws that may be necessary, and the development of foreign trade to make the American merchant marine a permanent institution.

We are awake once more on this subject of ships and shall not go to sleep again, any more than we shall go to sleep in the automobile industry, or railroading, or aircraft, or military preparedness.

War has taught every class of American producer the vital importance of ships. The American farmer, for example, has suffered from lack of ocean tonnage during the war in selling his specialties, such as fruit, and has also suffered for lack of fertilizers. Today he knows what ships mean in farming and is looking ahead not only to the protection of the American merchant marine, but will use it to extend his business. For instance, we are building many refrigerator ships to carry beef to the war zone, and these will be useful after the war to sell red apples, California and Florida oranges, dairy products, and the like of the American farmers.

We are building army transports which after the war will be converted into cargo-and-passenger liners to South America and other regions, furnishing quick delivery service for the American stockman to sell valuable breeding animals abroad.

MERCHANT MARINE VITAL TO NATION'S WELFARE

The manufacturer has felt the pinch of scarce ocean tonnage to even a greater degree, both for the sale of his products abroad and the import of his raw materials. Today he knows the value of ships and understands that an American merchant marine is vital to the national welfare. It is not wholly a matter of cost. He wants the facilities. He wants American ships for protection against emergencies and he wants them for the direct high-class ocean service on American trade routes which will enable him to reach new customers, build new trade, and hold it.

What people want they usually get. The American people today are alert to the importance of ships, and our national business genius will be equal to working out all the problems and overcoming all the difficulties.

XUM

OUR INDUSTRIAL VICTORY

By Charles M. Schwab

Director General, United States Shipping Board Emergency Fleet Corporation

SECOND to the great military victory that the American Army will have won in France when this war is over will be the industrial victory here at home. It will be a triumph no less significant and enduring than that won on the battle-fields. The battle at home is now raging, and victory already is perched on the banner of the American shipbuilders.

Few persons realize what has been done in the shipyards since we entered the war. Without the constant daily observation of progress, such as I have enjoyed while personally visiting the shipyards of the country since I joined the government's forces, it might well have been difficult for me to grasp the big essential facts of our shipbuilding effort.

American yards today are building ships faster and better than anywhere else in the world. Our speed-up performances have revolutionized the industry. In building a huge merchant fleet in two years, or three or five, for that matter, we are doing the impossible; yet the fleet is coming on.

The story of our accomplishments in the yards that extend from Maine down along the Atlantic to Florida, along the entire coast of the Gulf of Mexico, and from southern California to the uppermost point of Washington, on the Pacific, is the most amazing account of industrial progress ever written.

The truth is that we in America have gone to shipbuilding just as we go to any other industrial enterprise. Whether we be making automobiles or harvesting machines, or what-not, we Americans have the habit of going after things with the single idea of getting them done. So, when it came to building ships, we violated every convention, if such a thing exists in shipbuilding, and set to getting the ships afloat in the shortest possible time.

We were not a shipbuilding nation when we entered the war. Today America is the greatest shipbuilding nation in the world. The Bureau of Navigation the other day informed Chairman Hurley, of the United States Shipping Board, that more tonnage had been built in this country during the last year than in Great Britain. That was one of the most significant reports given to the American people since the war began.

ACCOMPLISHING A MIRACLE OF PRODUCTION

Now, how did America bring about this miracle of production? Before the war the building of a steel ship, from keel-laying to launching, required from nine months to two years. Now we are building these ships in one month. Some have been launched in less than one month from the time of keel-laying. In the old days they used to lay the keel and then figure out where the rest of the ship was going to come from.

All that is changed now. Today the shipbuilders, with contracts calling for work that will keep their men engaged for months to come, order their material in wholesale quantities. One yard on the western coast has ordered steel for the construction of 39 ships. The only thing that remains to be done in that yard is to put the steel together.

The men are spurred on by a patriotic desire to help win the war. New methods of fabrication have taken the place of the old and slower ways, and every shipbuilder is on his toes, eager to take advantage of any suggestion that lends more speed to his task.

When the New York Shipbuilding Corporation at Camden, N. J., built the *Tuckahoe* in 27 days, the shipbuilding world gasped. Practical men at the head of some of our shipyards frankly disbelieved the story of the *Tuckahoe*. They said it was a physical impossibility to put together the steel required in a 5,500-ton collier in that time. But since then the *Tuckahoe's* record has had to go into the

© Committee on Public Information

THE FIRST OF A FLEET OF 180 SHIPS TO BE LAUNCHED AT HOG ISLAND

The *Quistconck* is to be used in the transportation of food and supplies for American troops in France. It is a 400-foot vessel drawing 24 feet of water when loaded. Its keel was laid on February 12 and the launching took place August 5. Twenty-seven rolling mills supplied the steel for the ship and 980 men were employed on its construction.

XUM

THERE WAS FEASTING AND REJOICING AT HOG ISLAND ON THE DAY THAT THE SHIPYARD'S FIRST VESSEL WAS LAUNCHED

A view of the tables where luncheon was served to the guests at the greatest going-in party ever given in a shipyard. The thousands who came to see the launching of the *Quistconck* stood in the noonday August sun for hours, and 500 were overcome by the heat.

discard. It was a splendid achievement, and all the more glory belongs to the builders of the *Tuckahoe* because their example has inspired other yards to even better records.

A SPEED CHALLENGE TO EVERY SHIPYARD IN THE COUNTRY

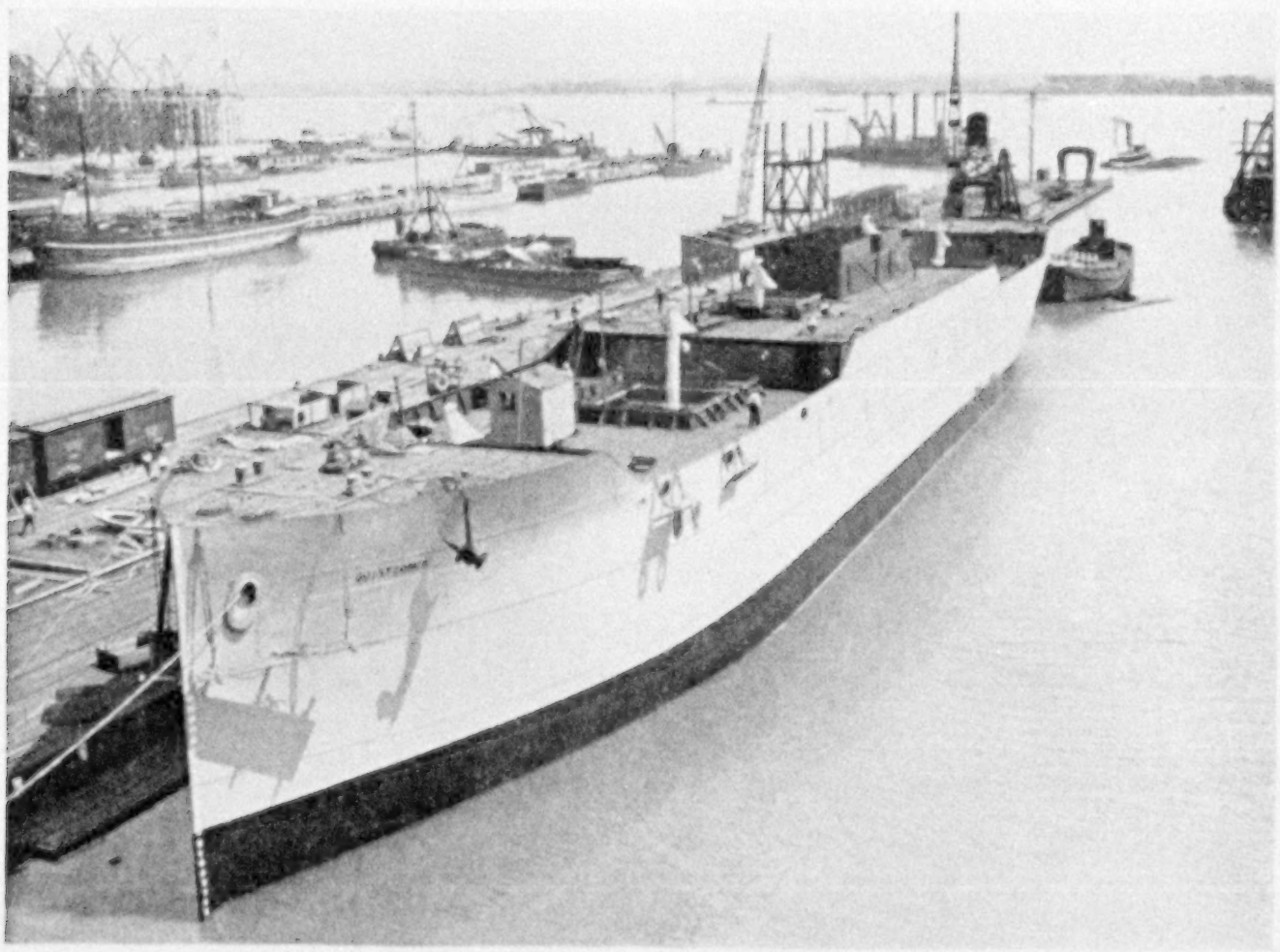
When the *Tuckahoe* was launched, a speed challenge went forth to every yard in America, and since then three shipbuilding plants have succeeded in lowering the record. First came the Bethlehem Shipbuilding Corporation at Alameda, Cal., which put a 12,000-ton cargo boat, the *Invincible*, into the water in 24 working days after the keel was laid. Then the Great Lakes Engineering Works, at Ecorse, Mich., built a 3,500-ton freighter, the *Crawl Keys*, in 14 days. More recently the Grays Harbor Motorship Corporation built and launched the *Aberdeen* in 17½ days from keel-laying. This was a wooden boat, and the record is so much better than any previous performance in the history of wood shipbuilding that it defies comparison.

Now, remember that two years ago the building of the *Tuckahoe* would have taken a year or a year and a half, the *Invincible* two years or more, the *Crawl Keys* nine months or one year, and the Good Lord only knows how long it would have taken to build a wood boat.

The success of American shipbuilders in lowering the time required for building steel vessels is due to three important factors:

First, and in my mind foremost, is the splendid spirit that actuates the men in the yards and leads them on to better and better performance.

Second, the organization that has been built up in our yards in the last year



READY FOR OUTFITTING

As soon as the *Quistconck* had left her shipway and was afloat on the waters of the Delaware, a fleet of small tugs towed her to the fitting-out basin. In the meantime huge cranes were laying the keel of a new vessel on the ways which the first Hog Island ship had just quitted.

makes for efficiency and permits all of the speed achievements mentioned.

Third, there have been marked improvements in the methods of hull construction and assembling of material. As pointed out before, the material for ships is assembled in huge quantities. When the time comes to put together this material, the stuff is all there.

STANDARDIZATION OF SHIP CONSTRUCTION

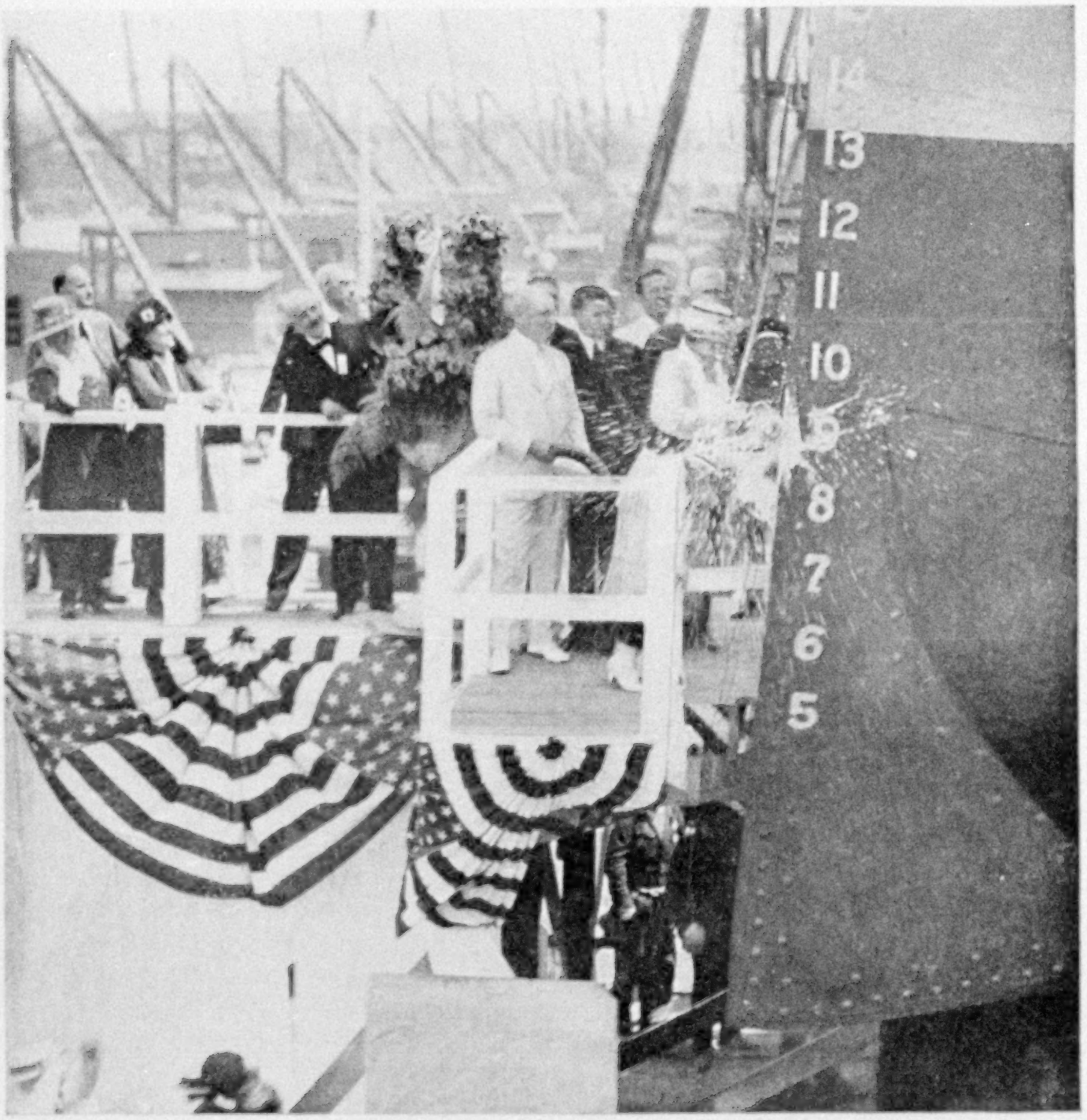
There are other factors that play an important part in our new speedy construction. In the last few months, particularly, we have been working toward the standardization of ship construction.

Before the war every yard was building ships according to its own design. Just as a dressmaker cuts out patterns from a dress, a shipbuilder builds the frame of a ship, and in the old days every ship called for a different pattern. There may have been some vessels with double decks, some with triple. The types were almost as many as the ships. That is true to a certain extent today, for we are only now getting the requisitioned ships completed. As fast as they go off the ways we are instituting our standardization process.

Soon we hope that each steel shipyard on the market will be building a single type of ship. The advantages of this are obvious and are twofold: First, there is the economical advantage from the building viewpoint; second, there is the equally advantageous saving from the viewpoint of the ship-owner and the ship-buyer. The saving in cost of construction begins, with the standardized ship, in the shops, scattered throughout the country, which supply the material with which ships are constructed.

Take the matter of buying plates, for example. When a shipyard, under the standardization scheme, buys plates for

XUM

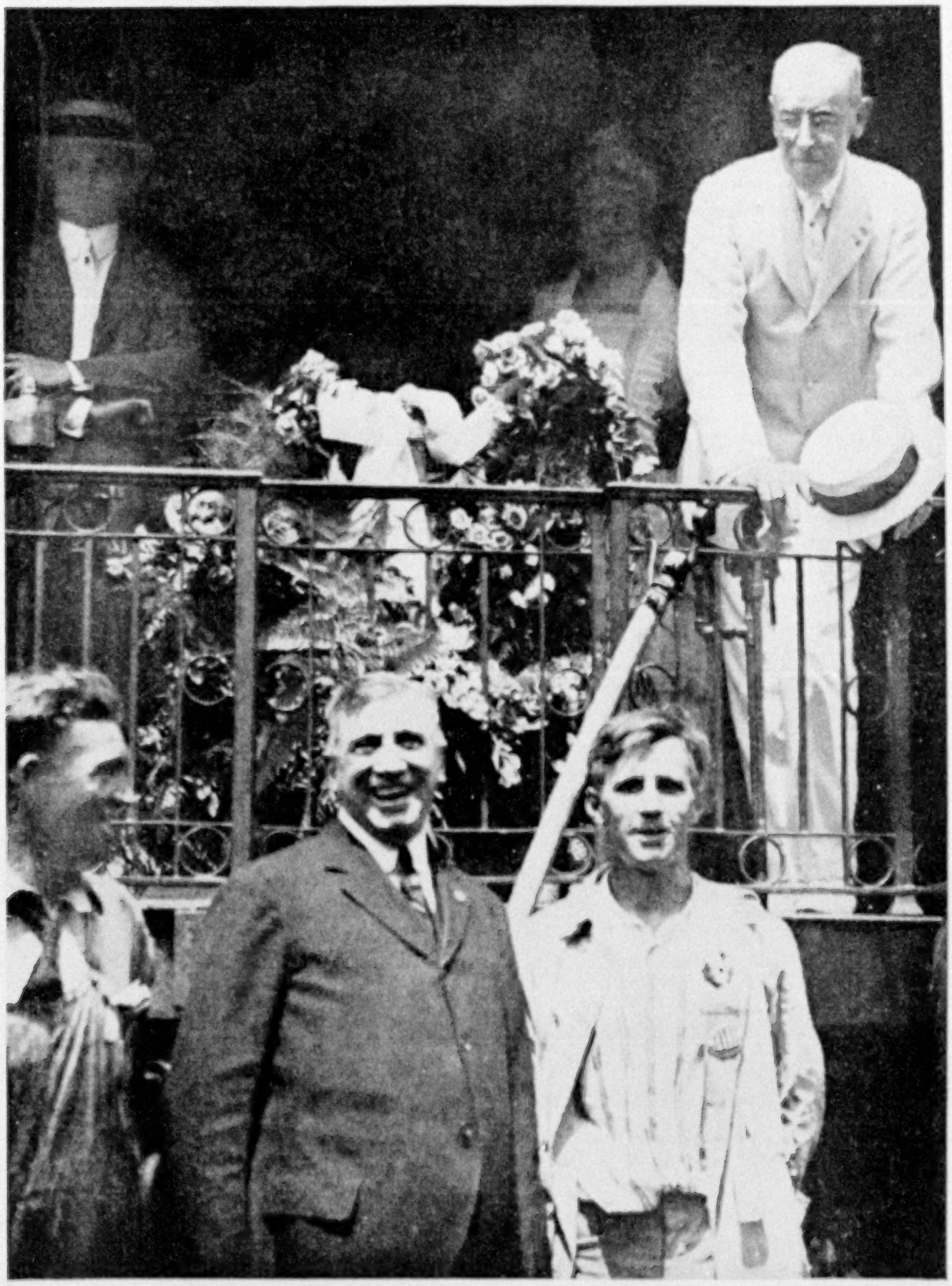


MRS. WOODROW WILSON: "I CHRISTEN THEE 'QUISTCONCK'"

The First Lady of the Land chose *Quistconck* as a fitting name for the first ship launched at America's largest shipbuilding plant because this was the Indian name for Hog Island. There is an interesting story about the chronometer which has been installed on the *Quistconck*. It is a British-manufactured instrument, which was presented to a British sea captain by a German prince as a testimonial of the German's appreciation of British hospitality off the coast of Brazil 75 years ago. As there were no manufacturers of chronometers in America at the outbreak of the war, our new American ships are being equipped with used instruments. The British Admiralty was asked to supply us with 700 of these delicately adjusted time-pieces essential in the navigation of ships. The *Quistconck's* chronometer was one of them.

a certain type of ship, it can order in quantity lots. The steel mill knows that separate pieces are of a standard size and design. The mill workers, therefore, can go ahead turning out these standard plates in large numbers. The standardization saves them from stopping now and then to change their cutting and stamping machines. Every halt of this kind in a big rolling mill means loss of time and labor.

The same is true of all the other shops



Photograph by Carl T. Thoner

A MASTER STATESMAN, A MASTER OF INDUSTRY, AND TWO MASTER WORKMEN—ALL THINKING SHIPS

President Wilson from the rear platform of his train has just congratulated Charles M. Schwab, Director General of the Emergency Fleet Corporation, and two champion riveters upon the successful launching of Hog Island's first fabricated ship.

XUM

© Committee on Public Information

FOUR SMILES THAT MEAN MORE STEEL SHIPS

In maintaining and improving the morale of the shipbuilders, one of the most effective agencies has been the publication of weekly newspapers for the workmen in most of the large plants. There are more than 30 of these "house-organs," so to speak, now being issued, and the names of many of them are picturesque as well as characteristic, as, for example: "Blockade Runner," "Fore and Aft," "Speed Up," "Chips," "Do Your Bit," "The Federal Shipbuilder," "Going Some," "Heave Together," "Over Here," "Over the Top," "The Pathway to Democracy," "The Merchant Mariner," "Fulton Flipper," "Steel Topsides," "Win the War," "Dry Dock Dial," "Sisco Periscope," and "Turbine Topics."

XUM

219

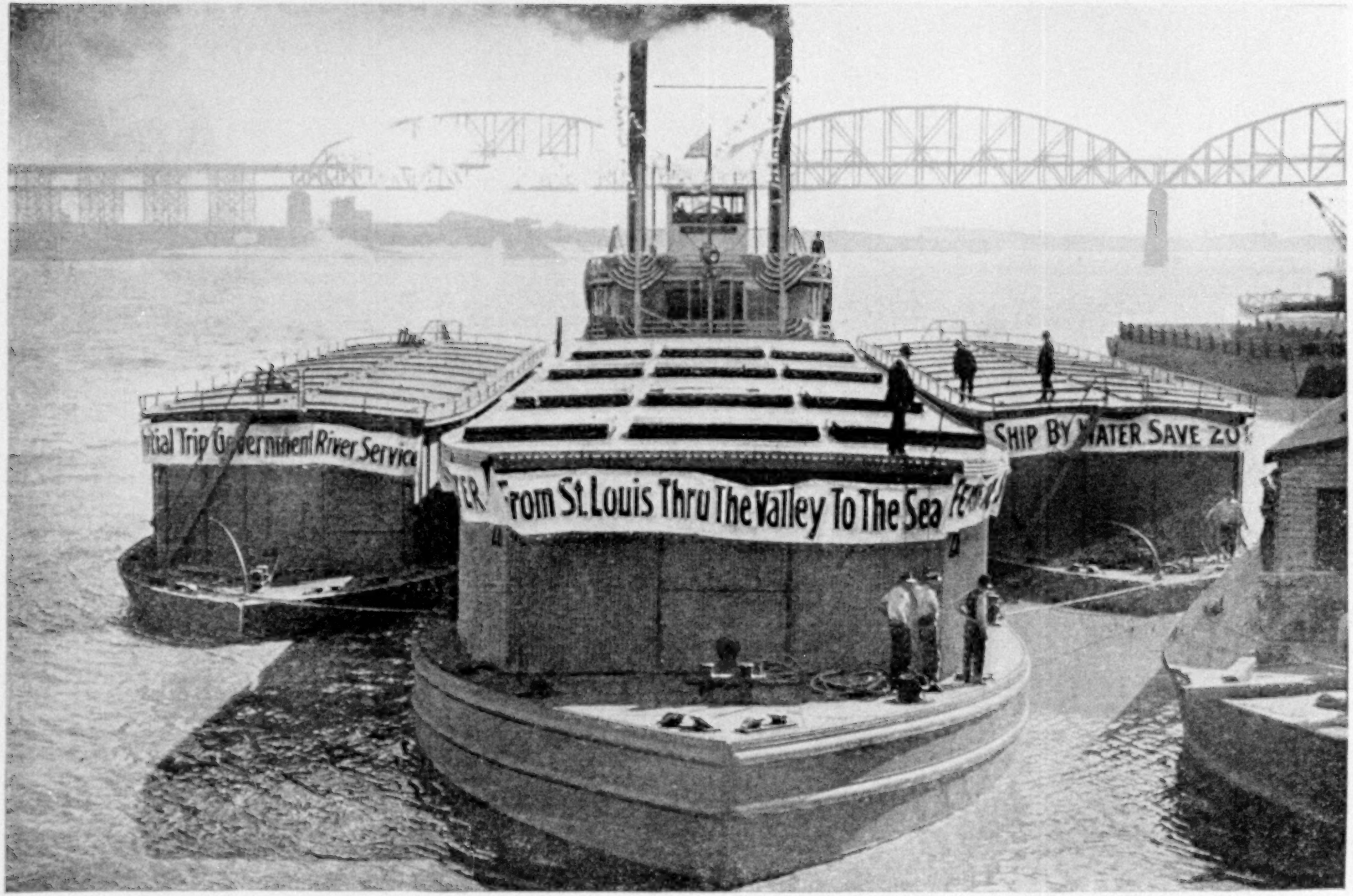
© Committee on Public Information

THE MEN WHO HAVE ACCEPTED THE GERMANS' GAGE OF BATTLE AND WHO ARE PLEDGED TO FURNISH AMERICA WITH SHIPS FASTER THAN THE U-BOATS CAN SINK THEM

Riveters, reamers, shipwrights, drillers, coppersmiths, plumbers, calkers—in all, the representatives of 30 trades—are employed in building the great merchant fleets which the United States requires in order to keep our troops supplied with food, clothing, and the munitions of war

GLOUCESTER SKIPPERS STUDYING "SCIENTIFIC" AT A NAVIGATION SCHOOL

Astronomers, explorers, and former sea captains are among the instructors in navigation in the schools which are equipping men to serve as officers of America's rehabilitated merchant marine



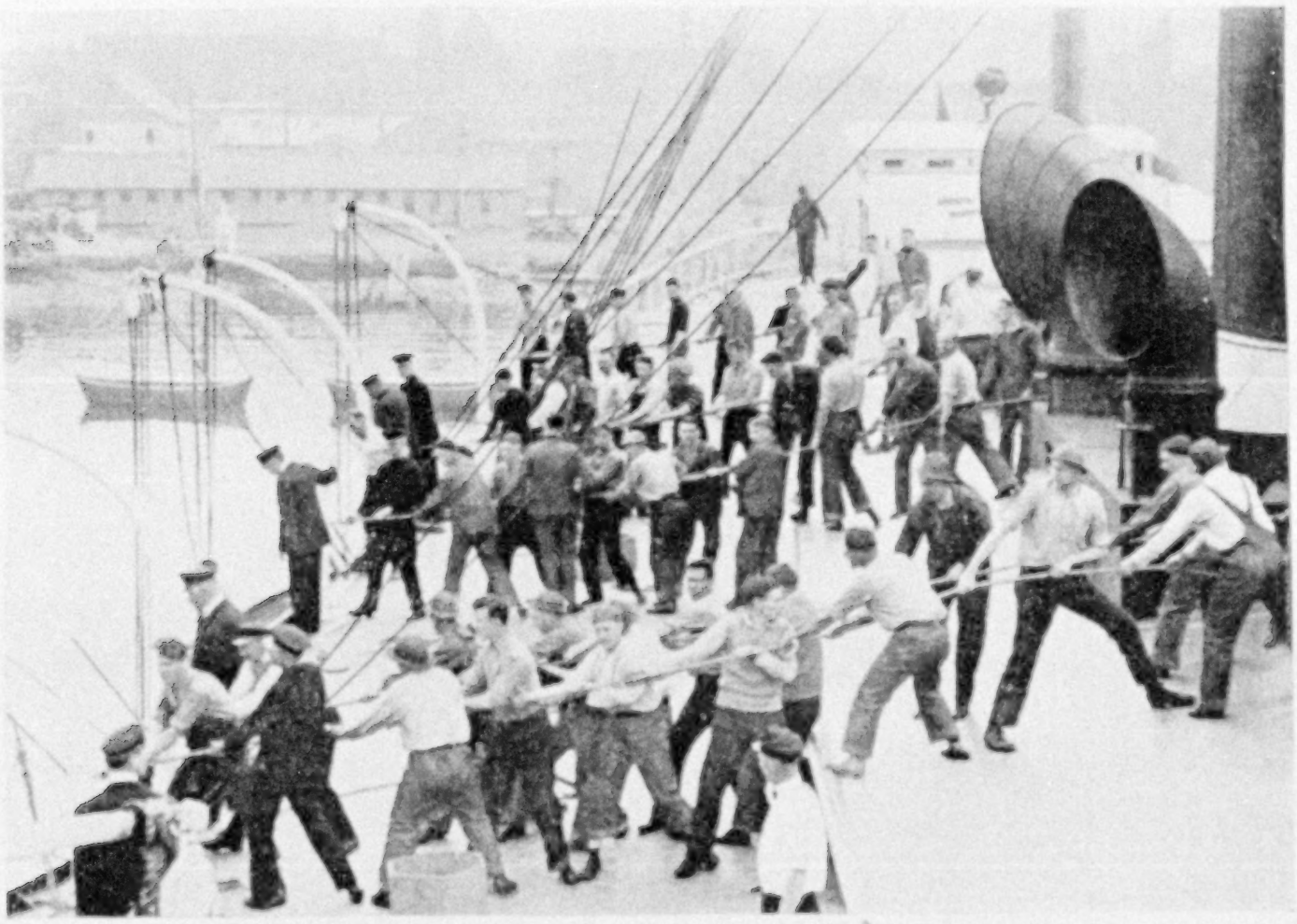
Photograph by P. R. Papin

REVIVING INLAND WATERWAY TRAFFIC BY THE USE OF STEEL BARGES

One of the many indirect blessings which are resulting from the war is the utilization of our rivers and canals as channels of commerce. Recently the business men of St. Louis reinaugurated a freight-barge service between the Missouri metropolis and New Orleans. The venture promises large development and expansion in the immediate future. It is also an important wartime measure, for it helps to relieve the congestion from which the railroads are suffering.

"LEARNING THE ROPES" ON BOARD ONE OF THE MERCHANT MARINE RECRUITING SERVICE TRAINING SHIPS

More than 28,000 American youths have been trained as merchant mariners since February. This number is being increased at the rate of 100 students a day; but there is room for all. Uncle Sam will need 175,000 men to man his merchant fleets at the end of the war.



HOISTING IN LIFEBOATS AFTER DRILL AT DOCK

The United States Shipping Board training ships, on which apprentices are taught to become seamen, spend five days a week at sea and two days at their base. The stay in port is not allowed to interfere with lifeboat drill.

that manufacture the hundreds of parts necessary to the building of a big steel steamer. So long as these parts are for a given size and type of ship, they are made to an exact pattern and dimension.

Similarly, when the ship-buyer wants, say, an 8,800-ton cargo vessel, under the standardization process he knows to whom he can turn for a vessel of that size and of the type that he desires. It is just like the automobile buyer of today, who knows where he can get a car of certain horsepower, size, and design. The saving that took place in the steel mill and in the industrial plants will benefit the buyer.

The comparison, in my mind, between automobile factories and "ship factories" is more real than mere theory. I think that our plan for standardizing ships will work out in a practical way, just as the standardization scheme in the automobile industry has been brought about.

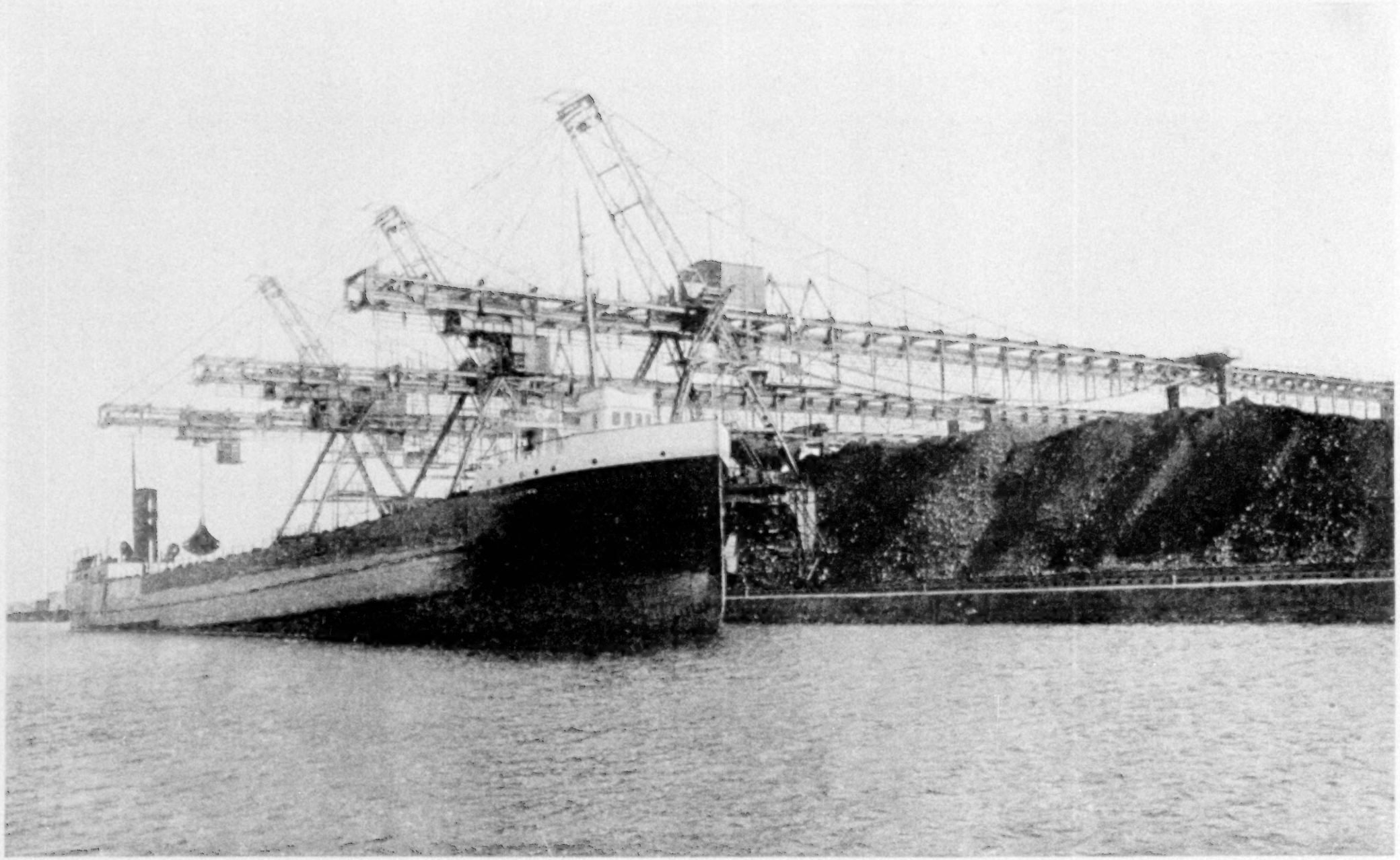
The great object to be attained from all this, of course, will be the greater speed in tonnage production. That is the imperative need of today, and so long as the war lasts the demand for rapid ship construction will remain. Every mile gained by American armies in France calls for more tonnage, for with the lengthening of our lines of communication and the strengthening of our man power abroad the need for more food and munitions will increase.

By January 1 we hope to have completed the great bulk of requisitioned tonnage that was on the ways when the United States entered the war. That will mark the definite turning point in our ship production. By that time we will have put into effect our standardization plans, and then, I firmly believe, America's shipbuilding machinery will be running at higher speed and greatly increased efficiency.

Photograph by Leon H. Abdalian

A VIEW OF THE WATERFRONT AT BOSTON

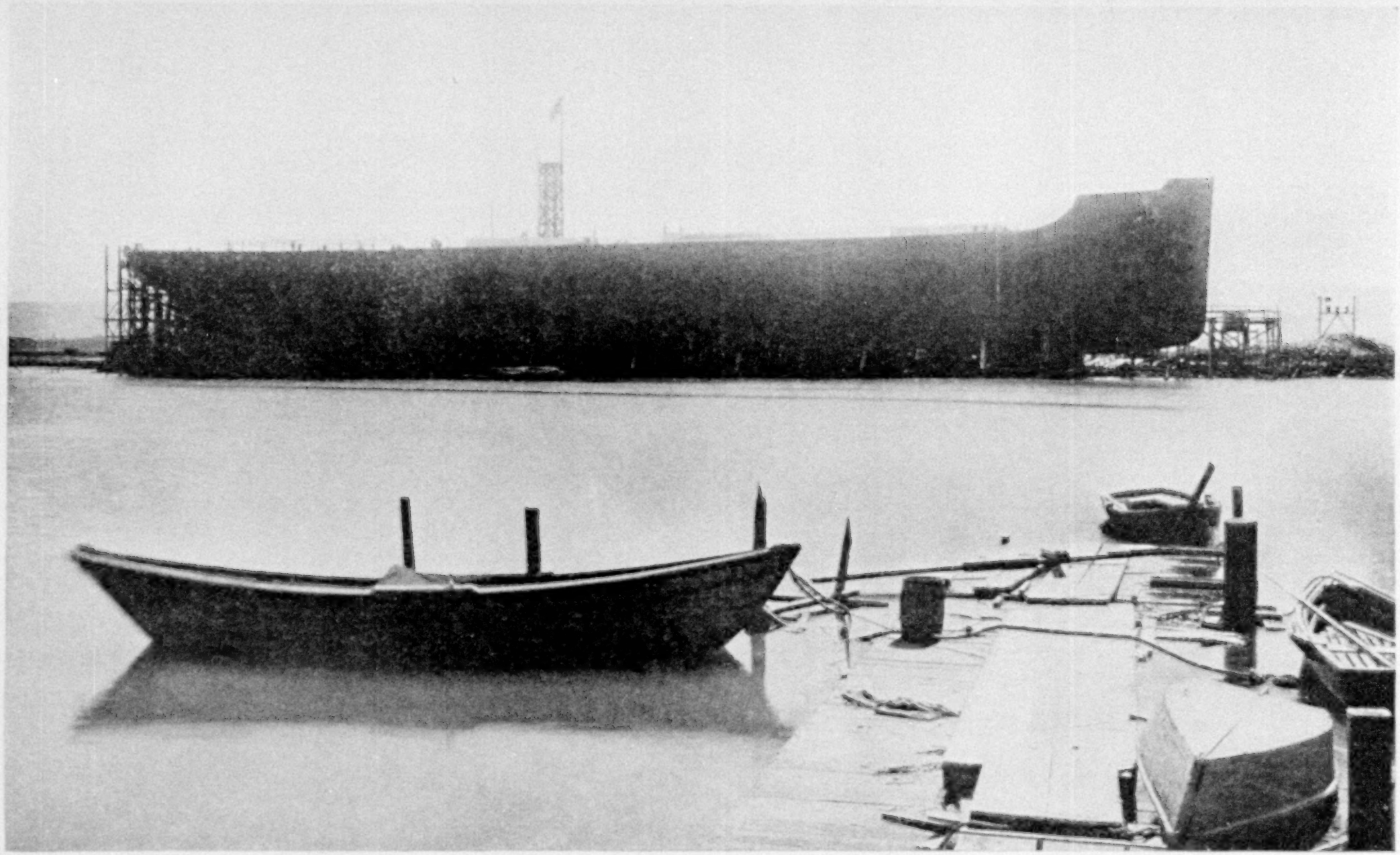
The war has imposed a burden on the shipping facilities of the New England metropolis second only to that which is being borne by New York. How best to improve the equipment of the docks and warehouses of all our Atlantic and Gulf ports, both for immediate needs and for after-the-war commerce, is one of the responsibilities of the Port and Harbor Facilities Commission of the United States Shipping Board.



Photograph by L. P. Gallagher

LOADING AND UNLOADING CARGO SHIPS ON THE GREAT LAKES HAS BEEN DEVELOPED TO AN ECONOMIC SCIENCE

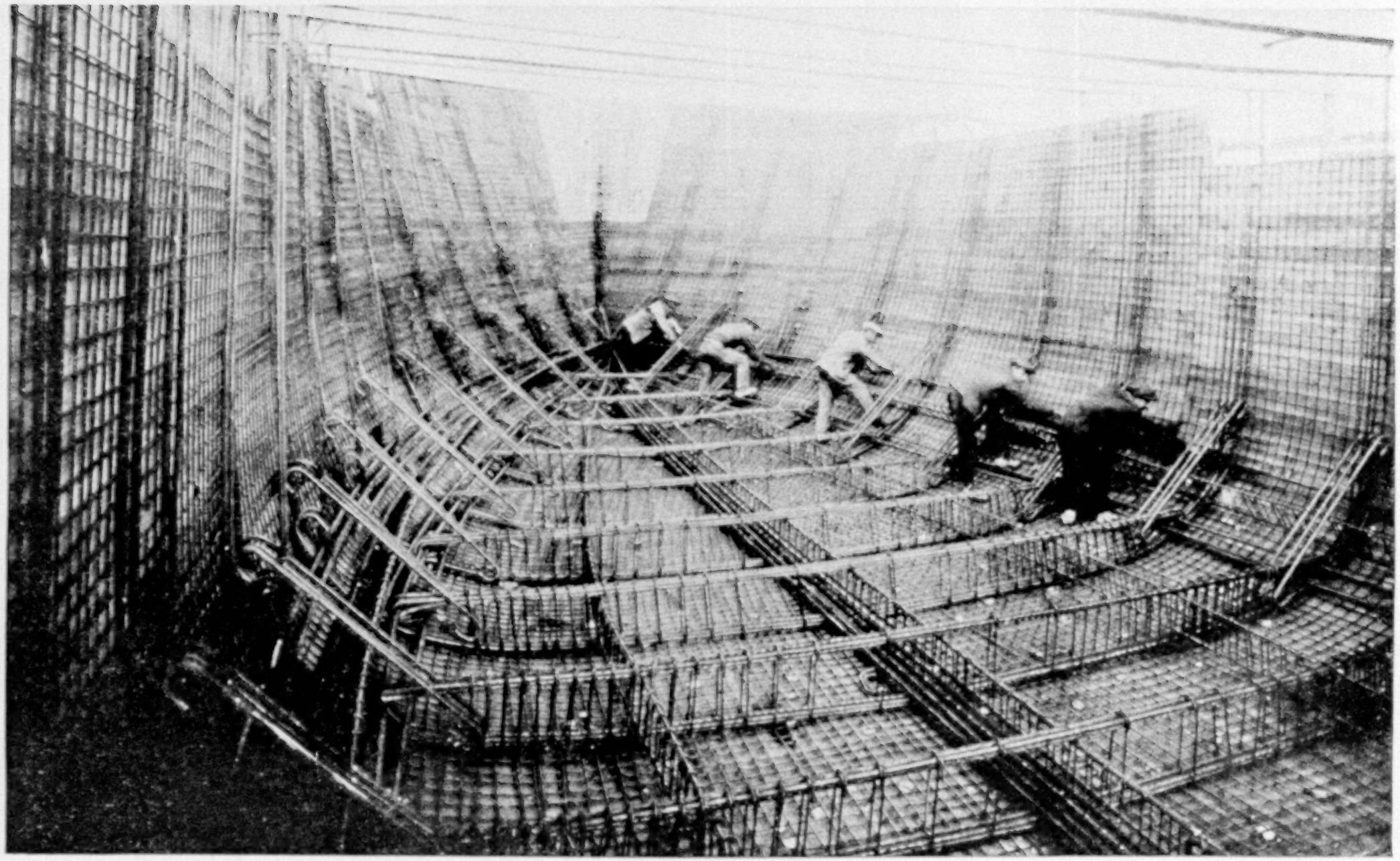
Many are the object-lessons which the Great Lakes fleets furnish to the salt-water ship owner and operator. The big ore-carriers of our inland waters use only a little more than half an ounce of coal in carrying a ton of freight a mile, while gigantic unloaders, lifting 17 tons at a time, can free a ship of its ore cargo at five cents a ton. Regardless of low wage scales of other lands, no maritime country in the world could compete with the United States on the Great Lakes, with its highly organized and wonderfully developed industrial machinery for handling a big job in a big way.



THE "FAITH," ONE OF THE LARGEST CONCRETE SHIPS EVER LAUNCHED

The chief arguments in favor of the concrete ship are cheaper and quicker construction and the employment of less skilled labor. To build a concrete vessel, a skeleton is employed which is packed round and filled in with concrete. Strong under compression, but with comparatively no tensile strength, this defect is remedied by reinforcing with steel rods.

XUM



Photograph from Portland Cement Co.

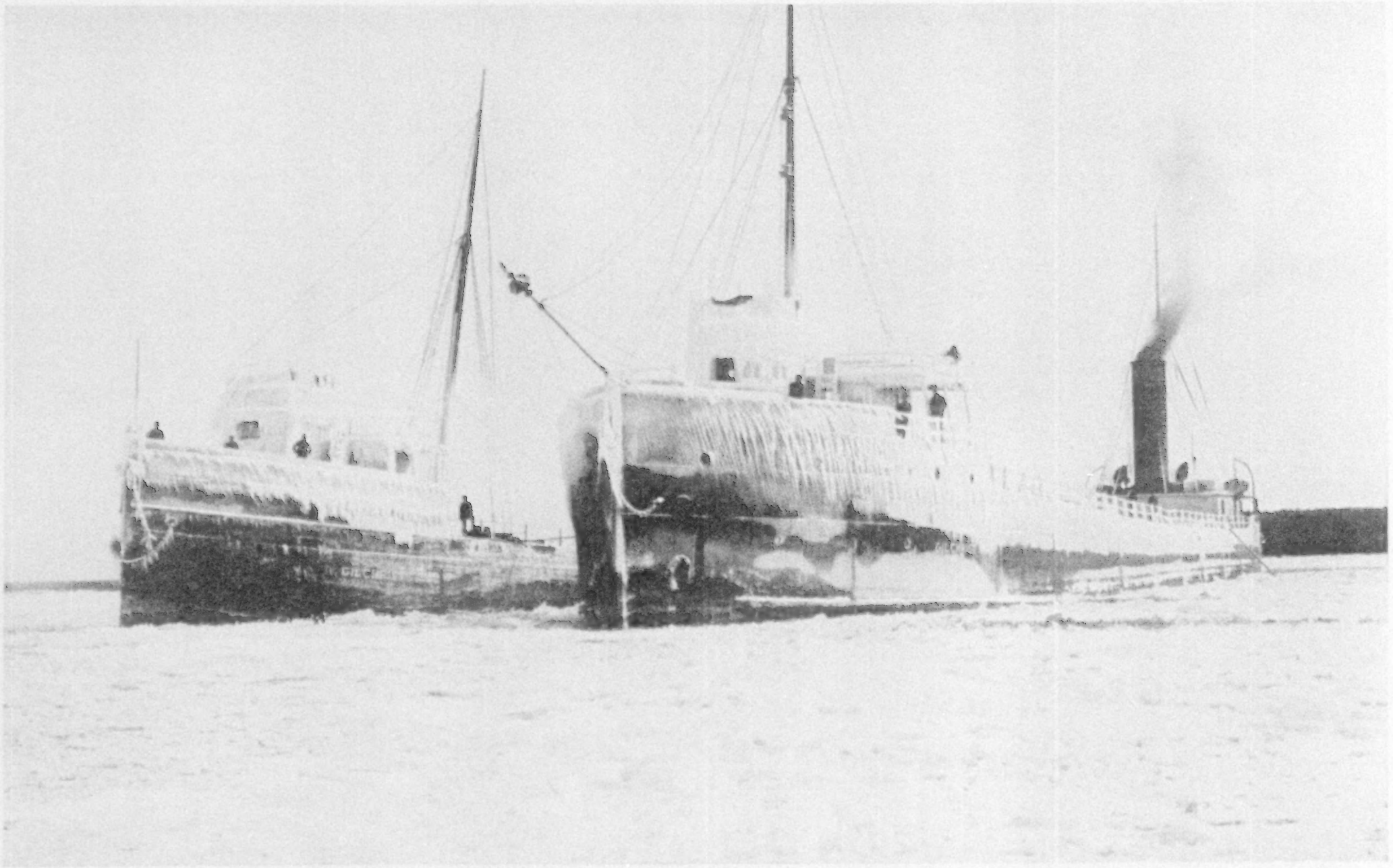
MAKING READY THE STEEL BONES OF A CONCRETE SHIP

The United States has established five shipyards of four ways each where concrete vessels are being constructed. The Shipping Board, however, has not in recent months sought to expand the activities of the concrete yards for the reason that the facilities for the production of power equipment for ships have not been sufficient to meet the hull-producing capacity of the steel and wood shipyards. A steel ship, it is estimated, is from 15 to 20 per cent more efficient as a cargo-carrier than a wooden or concrete ship of similar tonnage.

Photograph from the Globe Photographic Service

THE HARBOR AT CHICAGO, AN INLAND CITY WHICH HAS POINTED THE WAY FOR SOME OF OUR SEABOARD SHIPPING CENTERS

Perhaps because its water-borne commerce did not grow so rapidly as to outrun the imagination of the city's builders, the shipping facilities at Chicago have kept pace with the needs of the time much more effectively than the facilities of some of our Atlantic, Gulf, and Pacific seaports



Photograph by A. E. Young

TWO ICE-BOUND SURVIVORS OF A WINTER'S GALE ON THE GREAT LAKES

When our ports and harbors are so equipped that freight can be as expeditiously handled for sea-going craft as for the Great Lakes fleet of ore-carriers, the United States can pay higher wages to its shipbuilders and to its mariners and still compete with other nations in carrying the world's commerce.

THE WAR AND OCEAN GEOGRAPHY

By the Editor

SO FAR-REACHING have been the effects of the great world effort to throttle autocracy before autocracy could throttle the liberty of the human race that one might catalogue the entire range of human activities without writing down a single interest of mankind that has not been affected in greater or less degree. Yet it is difficult to find one interest, except the larger one of human freedom, more radically touched than that of the seas.

Twenty-odd million tons of shipping lie at the bottom of the ocean or float around as helpless derelicts which multiply the dangers of the deep. And with these ships has gone to Davy Jones's locker such an array of merchandise and munitions as no one ever dreamed would be his—beef and flour that might have saved millions from the threshold of starvation; railroad engines that might have moved the trains of a nation; munitions that might have sufficed the cause of victory in most of the wars of history.

Some day the war will be over, a peace that will make the whole world a parliament of man will be signed, and the race will be permitted, unshackled from its fear of the hydra-headed Hun, to settle back into the pursuits that make for its well-being.

THE CALL FOR GREATER KNOWLEDGE OF THE SEA

When that day comes the ocean will have new interest; for commerce, unfettered and free, will move up and down its lanes as never before. The world will be a family of nations taught by the sacrifices of many a trying hour to think more in terms of world welfare and less in terms of local advantage.

In that day there will be urgent demand for every ship that we are now calling into being for the world purpose of the moment—the annihilation of autocracy. Not only so, but there will be a demand for every ship that the shipyards of the nations can build in the years that lie ahead.

If world peace engenders international trade and international trade demands expanded shipping, expanded shipping in its turn will call for a closer knowledge of the sea. It may be true that the principal ship lanes of the ocean are almost as definitely traveled and marked as a Lincoln Highway or a Long Island boulevard, but withal, our knowledge of the bounding main is only fragmentary.

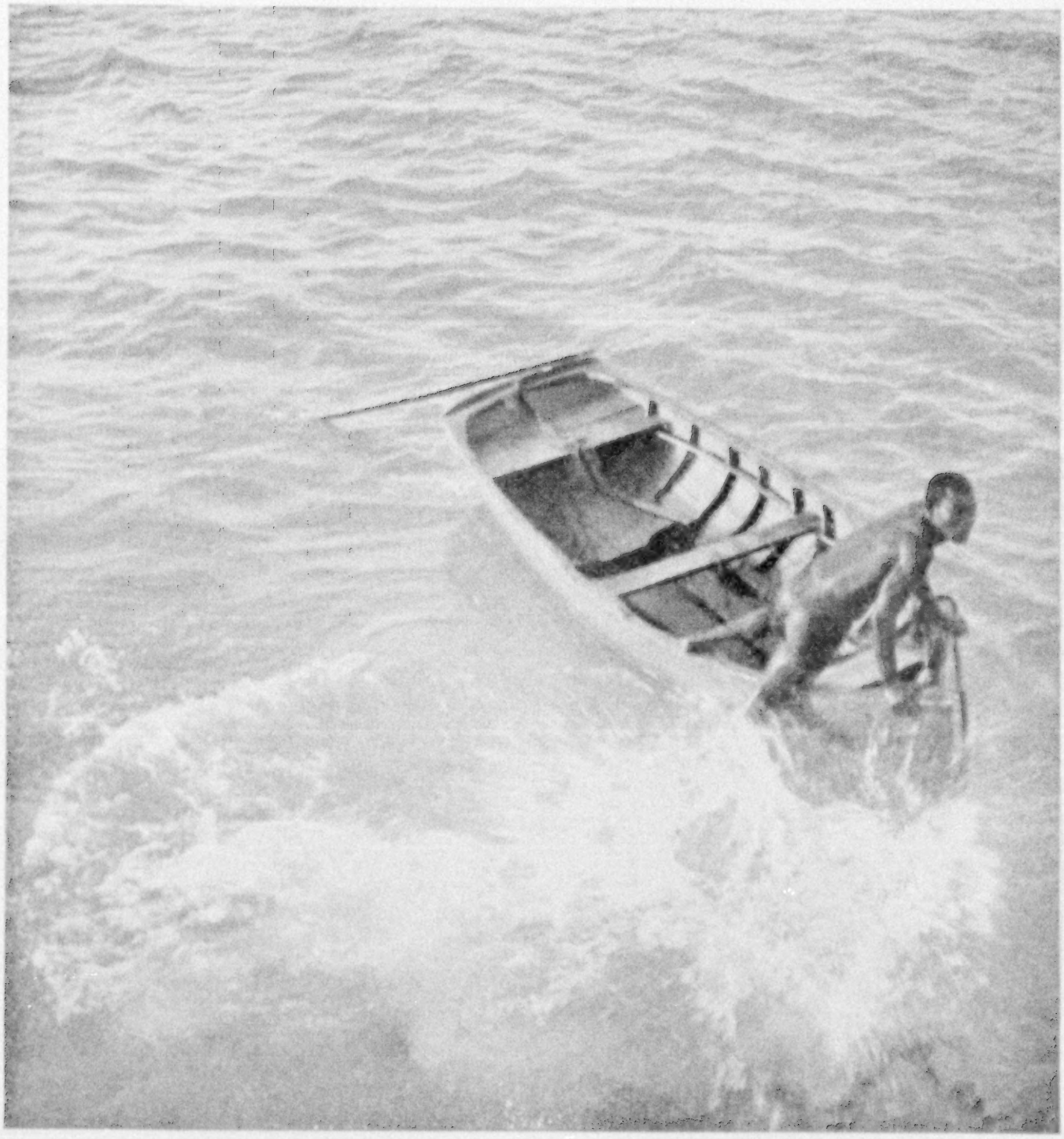
To begin with, the area of the sea is about three times as large as that of the land, and although as long ago as 1904 the governments of the civilized world had gotten together as many as twenty-five million observations of every kind and sort from the logs of merchantmen, warships, and government vessels, and although the results of a single expedition have filled over fifty massive quarto volumes, what we know about the sea is but the primer of the things it has to reveal.

OUR FRAGMENTARY SOURCES OF INFORMATION

Imagine men in airships cruising over a strange country, flying above miles of clouds, and once in a while dropping a sounding line down to earth and now and again letting down a dredge or a trawl; and suppose that country were the war zone in Europe. Do you think that under such conditions they would learn much about what was happening down below?

They might happen to sink their sounding tube into blood-sodden earth, or their dredge might chance to dig up a piece of shrapnel or a dead rat, while their trawl might catch a butterfly or capture a bumblebee; but certainly the specimens would not give a picture of the geology of the land, nor the things brought up by dredge and trawl afford an insight into what is going on at the bottom of the ocean of air, or of what inhabits the floor of that ocean.

Little wonder, then, that we marvel at



Photograph by Frederick I. Monsen

A DIVER IN THE HARBOR OF ST. THOMAS, VIRGIN ISLANDS

Lower the surface of the ocean 600 feet and you would transform the geography of the earth. Asia and North America would be united by a strip of land some 1,500 miles wide; the Dutch East Indies and Borneo would be tied to the continent of Asia; New Guinea would be a part of Australia; the North Sea would be only a narrow gulf off the point of Norway; Ireland and England would be one and a part of continental Europe; a traveler could go dry shod from Good Hope to Cape Horn via London, Berlin, Bagdad, Bombay, Pekin, Tokyo, Sitka, San Francisco, Washington, and Buenos Aires.

how much has been learned about the seas, the while we realize that what we know is much less than the proverbial drop in the bucket as compared with what remains a mystery.

The most impressive thing about the sea is its shallowness as compared with the size of the earth, and its depth as compared with the height of the land. If you were to take a globe six feet in diameter and excavate the deepest trench of the ocean thereon, it would be a bare pin-scratch deep—about one-twentieth of an inch.

XUM

Photograph from Mrs. Alexander Graham Bell

CUTTING UP WHALES ON THE SHORES OF NORWAY

The whale is the largest animal that inhabits the globe today, so far as geographers know. But one need only visit any of our great museums to find skeletons of sea monsters, discovered up in the Mississippi Valley and elsewhere, which far surpass in size any known living creature of land or water.

THE DEPTH OF THE SEA AND HEIGHT OF THE LAND

And yet so profound are the depths of the sea that the bulk of the water in it is fifteen times as great as the bulk of the land that rises above its waves. In its deepest trench the tallest mountain on the face of the globe could be buried and ships could still pass over the spot with a half mile of water under them.

The average depth of the ocean is more than two miles—about 12,480 feet, the oceanographers estimate. On the other hand, the average height of the land is less than half a mile—about 2,250 feet. How much further beneath the waves the sea bottom lies than the land crest above them is shown by the fact that while only one per cent of the land rises to an altitude of 12,000 feet, 46 per cent of the ocean's floor lies under more than 12,000 feet of water.

The relative height of the land surface and the sea bottom is about in keeping with their relative areas, there being 71 acres occupied by the sea for every 29 held by the land. If it were possible to drain off the upper 10,000 feet of the waters of the sea and to lay bare the floor that lies under it, the territory thus recovered, added to the land now above the sea, would give only a fifty-fifty division between land and water.

THE CONTINENTAL SHELF

The oceans as we know them are larger than the true ocean basin. As a monument is always planted on a base, so the continents have broad under-sea bases upon which to rest. To the oceanographers there is a line known as the 100-fathom line, which largely parallels the shore-line, but which is sometimes as much as several hundred miles out to sea. When that line is reached the bottom suddenly begins to slope down toward the abysmal depths.

The floor lying landward from this line is known as the continental shelf, and it is upon this broad shelf, with an aggregate area three times as large as that of the United States, that the continents are planted. By overflowing this vast area of slightly submerged territory, the oceans gather unto themselves ten million square miles of territory that in elevation belongs more to the land than to the sea.

As a matter of fact, the continental shelf lies in part under water and in part above, the part above being the alluvial plains of the continents. Where these plains are broad the shelf usually is broad, and where they are narrow the shelf is usually narrow. For instance, the plain on our Atlantic coast is broad, and there is a corresponding breadth to the continental shelf. On the Pacific coast the alluvial plain is very narrow, and the 100-fathom line is correspondingly close to shore.

WHAT THE CONTINENTAL SHELF COSTS MANKIND

From a practical standpoint, the part of the sea of most immediate interest to man is that which rests upon the continental shelf. Here are situated all the seaboard cities. Wherever the ocean lanes may meander up and down the briny deep they begin on the continental shelf and end there. But for that shelf there would be no bays or gulfs, no harbors and no havens, for the boundaries of the true ocean basins are infinitely more regular and less indented than the shorelines. Ocean-bound commerce would be vastly inconvenienced if it had to dispense with all the advantages that the continental shelf brings to it.

On the other hand, that shelf is a source of much difficulty to shipping and of much inconvenience to humanity. Upon the ten million square miles of territory upon which the sea has such a shallow lien a population equal to that of Europe and America might live. Aye, more than that—it is all practically level, the recipient of uncounted ages of rich contributions of fertility brought down by the rivers from the land, and it might support a population as dense as was that of Belgium before the hob-nailed boot of Hun warfare was set upon that smiling and teeming land.

Count the hundreds of millions of dollars that the nations of the earth spend on harbor dredging and coast-water surveying; figure up the tremendous losses of shipping tossed upon submerged rocks by raging seas; consider the losses involved in the unending warfare between

A MAP OF THE WORLD, SHOWING THE PRINCIPAL OCEAN CURRENTS

Through the seas run mighty rivers—some warm and life-giving, others from the icy poles. The Gulf Stream alone discharges a greater volume of water through the Florida Straits than is borne seaward by all the rivers of all the continents.

sea and shore, and you will begin to see that, even with all its blessings of safe harbors, land-locked bays, and havens of refuge, the continental shelf is not without disadvantages to mankind.

After peace comes again to bless mankind, and the nations, freed from the menace of war, are able to devote all their remarkable energies to trade, one of the first phases of oceanography that will command wide attention will be the shallow-water system fringing the continents. It took seventy million dead-weight tons of ocean shipping to carry the commerce of the world before the present war. That it will take vastly more to carry the water-bound trade of the years that follow is patent to all who have studied the situation.

The war has taught the world in thunder tones the interdependence of peoples and the interrelation of nations, and at the same time it has shown how much more mankind can accomplish when it is doing its utmost than when it lives as in the easy-go-lucky days of other years. And nations hereafter will not be content with the slow methods of the past.

HOW THE SUBMARINE MAY SERVE HUMANITY

With more ships afloat than there were before the heartless Hun ran amuck with the submarine, there will be a greater demand for minute surveys of all shallow water in coastal territory—thousands of square miles will need even the intensive method of the wire drag, which does not trust to soundings to reveal pinnacle rocks, but touches every square inch of the water at the appointed depth, and thus makes sure that nowhere is there an obstruction reaching above it.

It is probable that the submarine, an American invention prostituted to foul use by the Hun, will be rescued from its ignoble use and made to serve humanity where now it outrages civilization. Able now to descend to the bottom hundreds of feet below the surface, it is not improbable that before many years have passed submarine expeditions will take the place of polar expeditions and many mysteries of the sea will be solved.

One of the pressing problems of the after-the-war period will be that of the derelict. Among the millions of tons of shipping destroyed by the submarine, it is too much to hope that every ship torpedoed beyond the redemption of the salvage forces now lies harmless at the bottom of the ocean. That some of them are drifting derelicts, adding their menace to navigation, is certain.

STRANGE STORIES OF DERELICTS

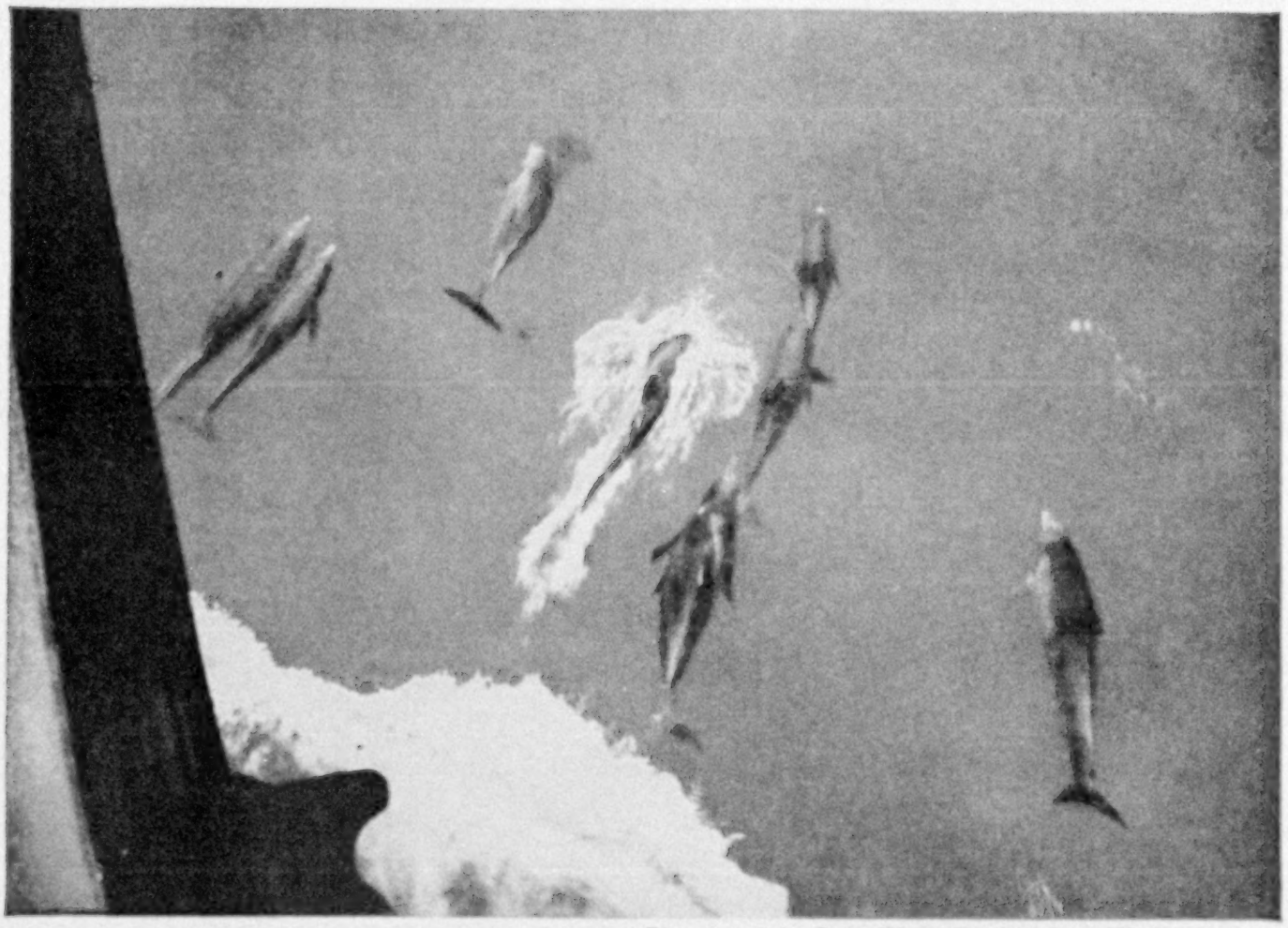
How hard it sometimes is to send a ship to the bottom is strikingly shown by the experience of the *San Francisco* in destroying the derelict three-master *Drisko* a decade or so ago. That derelict was only 248 tons, but she was lumber-laden. The officers of the *San Francisco* first tried to tow her to port, but found that impossible. Then they attached three 30-pound guncotton bombs to her keel and set them off; but still she floated. Five more bombs were set off; these broke her back and frames, but still she refused to go to the bottom. Then the *San Francisco* rammed her amidships and broke her in two, releasing the cargo; but even after that it took several shells to drive the after part of the staunch old schooner down into the jurisdiction of Davy Jones.

Even in peace times ships are often reported missing and appear to have been "sunk without trace." It is believed that most of such catastrophes are the results of collisions with derelicts. How many more such collisions there will be in the future may be imagined when it is stated that for two years the number of derelicts has greatly increased and the steps for their destruction have been much reduced.

KEEPING TAB ON THE DERELICTS

In normal times the Hydrographic Office of the Navy Department keeps careful check on the derelicts. Every ship that sights one of these menaces to navigation reports its location. The names of some of them remain visible, while others are susceptible of identification by their appearance. The Hydrographic Office gives each wreck and derelict a serial number and plots its position on a map. Each report is registered with an identification number. In this way, by a system of cross-checking, it is possible to identify each derelict, to determine the

XUM



Photograph by Capt. W. E. Dunlap, from W. C. Moore

A SCHOOL OF PORPOISES PLAYING AROUND A SHIP

Every foot of the ocean-bed traversed by the cables of the world has been surveyed. Sometimes examination of a cable reveals the fact that its coating of gutta percha has been melted by contact with submarine fire. Hundreds of deep-sea creatures attach themselves to these cords of communication, and thus live and die within a fraction of an inch of the electric impulses which tell the news of the world.

direction of its drift, and usually get it so well located that the Coast Guard cutters may run it down and sink it.

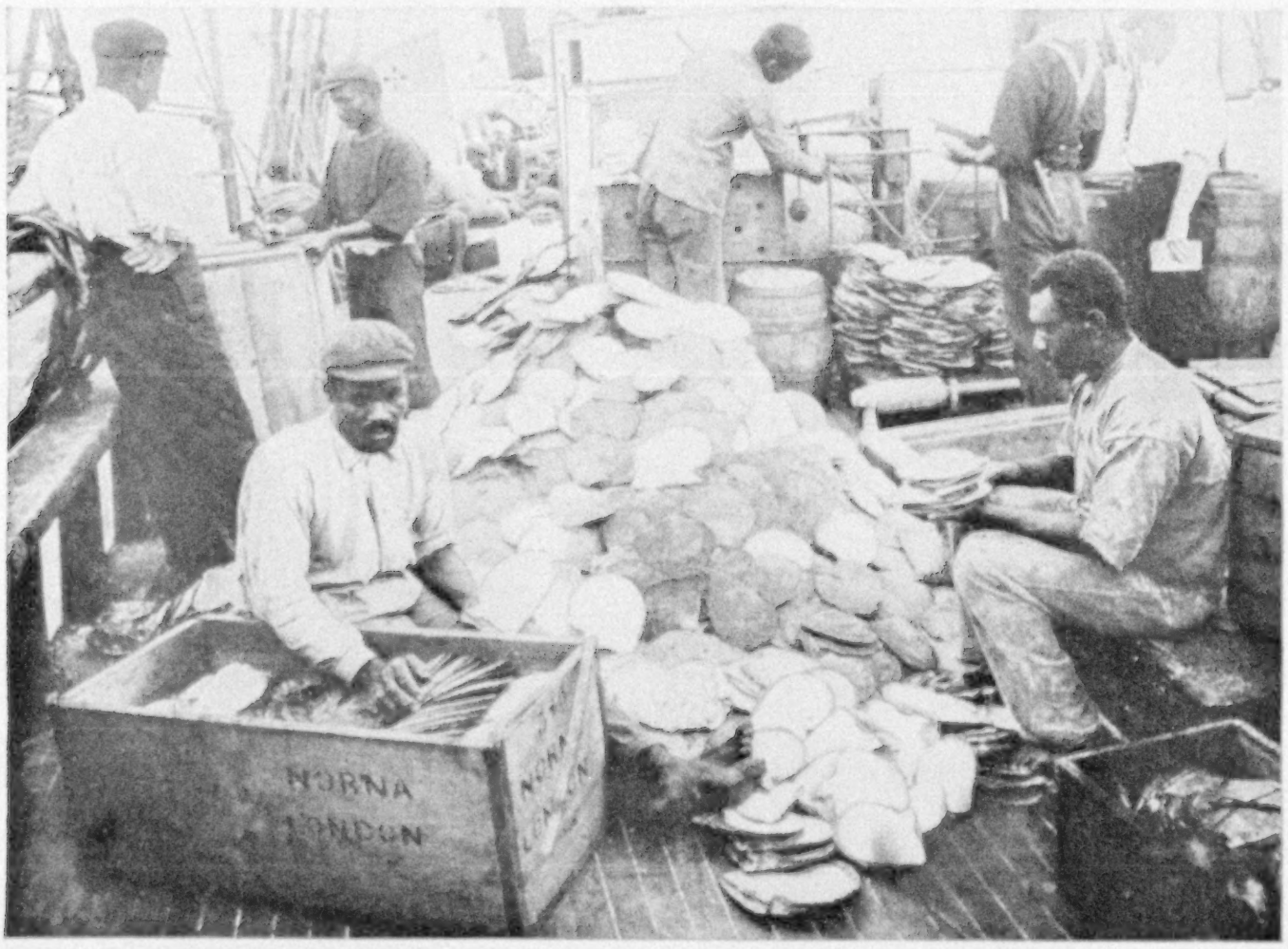
The information contained on the Hydrographic Office derelict map is transferred from time to time to the pilot charts, so that navigators may know where to be on the lookout for the semi-submerged hulks into which ships so often run in foggy weather.

WANDERERS ON THE FACE OF THE DEEP

In peace times there is no other menace to navigation as dangerous as the derelict, unless it be the submerged iceberg, such as sank the *Titanic*. Refusing to stay in one location, yielding to no law of navigation, hiding most of her hulk beneath the waves, the lonely, desolate, moss-covered, weed-grown derelict, with deck or keel all but awash, comes out of the night or through the fog as an assassin out of a lonely alley, and woe to the sailor who has not detected her approach.

Drifting hither and yon, now forced on by the wind of a stormy sea, now caught in a current and driven along, these rudderless, purposeless wanderers cover many a weary mile, with only screaming sea-birds to break the monotony of the roaring gale or the soft surge of a placid sea. Sighted frequently for weeks together, now and again they disappear, often reappearing suddenly hundreds of miles away. As many as a thousand have been reported in a single year in the North Atlantic. The majority of them frequent the Gulf Stream.

Examining the records of the Hydrographic Office, one finds that in six years 25 derelicts were reported as having drifted at least a thousand miles each; 11 have 2,000 miles apiece to their credit, while three sailed 5,000 rudderless miles.



Photograph from Charles J. Glidden

PEARL-FISHING BOAT AT THURSDAY ISLAND, AUSTRALIA

A man of medium size sustains a pressure of 30,000 pounds at sea-level. How much more he can endure is shown by the fact that a diver can safely go down 204 feet, which adds 180,000 pounds to the pressure his body must bear.

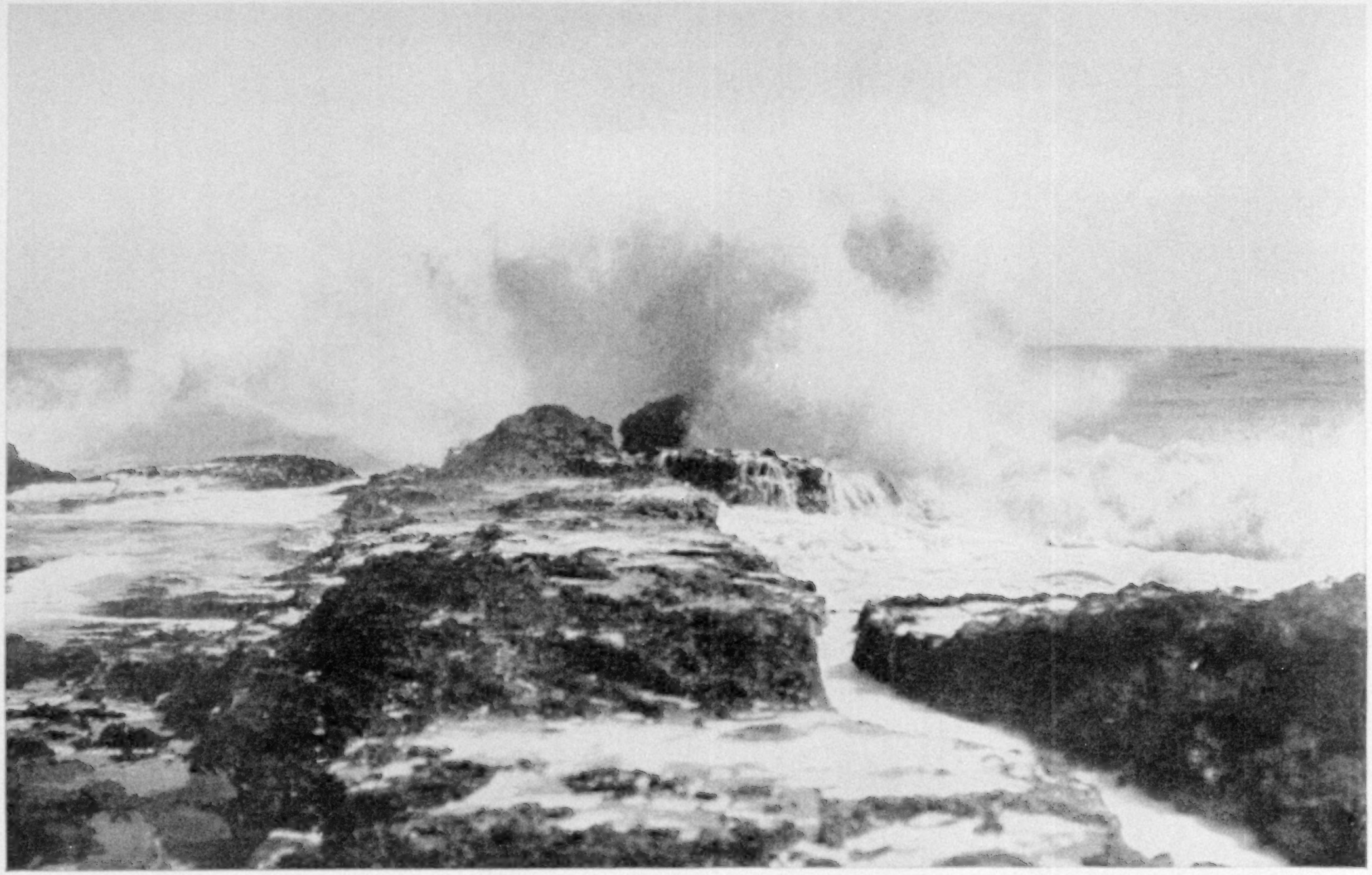
But the classic story of the wanderings of a derelict is that of the *Fannie E. Wolston*. Abandoned October 15, 1891, off Cape Hatteras, she traveled northward in the Gulf Stream. When off Norfolk, Va., she changed her course and headed across the broad Atlantic toward the shores of Africa. On June 13, 1892, she was sighted half-way across. Then she headed southward for more than 300 miles; then shifted her course to the northeast for another 200 miles, retraced her track for several hundred miles, turned again and went in the opposite direction, like a shuttle in the loom instead of a ship upon the sea.

Then she took another tack and headed west for nearly 400 miles; then shaped her course north for 300 miles, and then headed east again for 700 miles; so that in January she was almost in the same latitude and longitude that she had been in the previous June. In the following May she was a thousand miles away from where she had been in January, on the border of Cancer and midway between Florida and Africa.

Again she headed toward America for 600 miles, and repeated her shuttle-in-the-loom stunt. Then followed many long months of erratic zigzags, and she was sighted for the last time 250 miles off Savannah, Ga. She had remained afloat and had outgeneraled the waves for two years and a half, during which time she had sailed more than 7,000 aimless miles.

SHIPS OF MYSTERY

Verrill, in his splendid book, "The Ocean and Its Mysteries," tells us that upon two occasions ships have been found adrift sailing aimlessly about, under full sail, in perfect condition, but without a soul on board. When boarded, everything was found undisturbed and in



Photograph by Charles F. Holder

WHERE THE CONTINENTAL SHELF RISES ABOVE THE SEA

As a monument rests upon a base, so the continents have broad undersea bases upon which they rest and which oceanographers call continental shelves. The continental shelf ends at the 100-fathom line, which is sometimes several hundred miles out at sea, sometimes very close inshore.

order. Pots of partly cooked food were on the galley stove, charts and papers were spread upon the cabin table, and nothing was there to indicate how or when or whither skipper and crew had gone. He also tells of a derelict floating keel up which was destroyed by a naval ship. When the first shot was fired a multitude of cats appeared out of the hold. Prisoners of fate, they were the descendants of the ship's cats and had found imprisoned rats as prolific as themselves.

Another matter of pressing moment that seems destined to occupy a larger place in oceanographic research after the war is the question of sea food. The great conflict has demonstrated how close is the margin between food production and food consumption, and how much more pressing the food question is destined to grow in the years of peace and racial expansion that lie ahead.

THE OCEANS' INEXHAUSTIBLE FOOD RESERVOIRS

The oceans literally teem with food. The man who declared that humanity is a race of herring-catchers might have overstated the case, but that the sea abounds in food-fishes and fishes fit for food is well known. As soon as we begin to study the subject of ocean fisheries, however, we come up short against the fact that what we really know about the inhabitants of the sea is startlingly limited.

It was not so long ago that the fishermen of the North Sea believed that whales brought the herring in toward shallow water—a conclusion they reached from the observation that schools of herring are frequently found in the vicinity of spouting whales. In 1906 there was a failure of the herring fisheries, and the fishermen blamed it on the Norwegian whaling vessels operating in that region.

Likewise, it is still a moot question whether or not modern fishing methods tend to deplete the supply, and whether artificial propagation of sea fishes is a sufficient counter-measure. A few years ago a British commission measured the intensity of fishing operations in the North Sea. Trailing bottles were set adrift, and it was found that more than half of them were recaptured. In certain localities they were captured at a rate that indicated 90 per cent retaken each season. Marked fish yielded largely similar results, and the conclusion was that a food-fish of adult size had at least three to one odds against its getting through the year uncaught.

And yet there is so little race suicide in the ocean that even such intensive fishing probably has no effect upon the available adult supply. For instance, the female turbot lays 8,500,000 eggs a year, and the cod has 4,500,000 to her credit. The female flounder lays 1,400,000, the sole 570,000, the haddock 450,000, and the plaice 300,000. The poor herring must be content with a meager 31,000.

Much remains to be learned about the migration habits of the world's food-fishes. Where do the salmon go after they leave the rivers? Why does the eel, as discovered sometime since by the Danes, go far out to sea, far to the south and west of the Irish coast, to spawn, and how do the countless hordes of delicate elvers find their way around the British Isles and into the continental rivers? Innumerable are the questions like these that the future will reveal to the oceanographers of a new day.

The problem of life in the ocean is one full of interest and pregnant with valuable lessons for mankind. Even at the bottom of the deepest trench in the abysmal region of the sea's bottom, where no ray of the sun ever penetrated, where Stygian night is perpetual, where freezing temperatures never cease and where inconceivable pressures prevail, the miracle of life still goes on. When you remember that the atmospheric pressure of 15 pounds per square inch means 30,000 pounds on a surface as large as an average sized man's body, and then consider that in some of the deeper places in the ocean the pressure is more than four tons to the square inch, or eight million pounds for a surface as large as a man's body, you will naturally wonder how any living thing can exist there.

QUEER CREATURES OF THE SEA

Yet eerie creatures do exist, even in the uttermost depths. Here is a fish swimming by with light-giving organs

XUM

Photograph by H. F. Reid

THE MOST FAMOUS OF MOUNTAINS, MOUNT ARARAT, IN ARMENIA

The peaks seen in the picture are Great Ararat (17,000 feet) and Little Ararat (13,000). They are about 7 miles apart and form the boundary of Russia, Persia, and Turkey, to each of which they partly belong. Once this great mountain was beneath the sea. Whether our good father, Noah, was an oceanographer or not, he was a splendid navigator, landing his ship safely upon a mountain top whose crest is now more than three miles above high tide at Alexandretta. Mount Everest, the land's highest peak, could be placed in the Challenger Deep, the sea's lowest trench, and still leave navigable water a half mile deep over its summit.

XUM

ranged in rows from nose to tail, on port and starboard sides, a fantastic miniature of an ocean liner, alight from stem to stern, gliding noiselessly through the perpetual night. There is another, with a well-defined searchlight with which to explore the blackness around. Here is a breathing caricature of a mermaid with binoculars, and there a creature whose eyes are upon the ends of long stalks reaching out from the head like sunflowers from the ground.

In size the inhabitants of the deep sea have as wide a range in the direction of microscopic minuteness as those of the land. It is hardly reasonable to suppose they would not range toward largeness as well. Indeed, there is evidence that immense creatures, with flesh of a texture hitherto unknown, exist in the ocean depths. Some years ago a strange object was washed ashore on the Florida coast. Photographs of this peculiar hulk and a piece of it were sent to Professor Verrill for examination. It measured twenty feet in length, forty feet in circumference, and weighed many tons. He found its flesh of a tough, fibrous nature, unlike any known, and concluded that this huge object was but a fragment of some monster of the sea, torn from it by some cataclysm of the deep.

STUDY OF OCEAN CURRENTS

Another phase of oceanography that will demand and receive close attention in the years when navies fulfill a new mission—the illumination of the dark places in man's knowledge of the sea—will be the ocean currents. The effect of these great rivers of the sea upon the welfare of the human race is past imagination. It is said that the Gulf Stream carries enough heat toward Europe every 24 hours to melt a mass of iron as large as Mt. Washington.

Rear Admiral Pillsbury, in his remarkable article in the GEOGRAPHIC MAGAZINE describing this remarkable river of the sea, says that every hour there passes through the straits of Florida the enormous total of ninety billion tons of water, carrying enough salt to load many times over every ship that sails the main. Through these straits the stream is 40 miles wide. It carries more water than all of the streams of the world bring down from the land to the sea.

In each of the four quarters of the globe there is a wonderful circulatory system—the heavy, cold waters of the polar seas rushing equatorward, and the light, warm waters of tropic oceans sweeping back, giving a huge swirl not unlike the motion of water driven around the bottom of a basin by the hand.

Vessels and débris caught in these currents often play uncanny tricks. In 1905 the *Stanley Dollar*, an American freighter, went upon the rocks at the entrance to Yokohama Bay. Her life-preservers were washed out as she lay upon the beach upon which she was run to prevent her sinking.

In 1911 two of her life-preservers were picked up on the shores of the Shetland Islands, north of Scotland. How they reached there is one of the puzzling questions that so often arise anent the sea. Did they sweep up the Asiatic coast, through Behring Strait, and then through the Northwest Passage and Baffin Bay, and thence by Iceland to the Shetland Islands? Or did they, after floating through the Northwest Passage, get into the Polar Current and sweep down the Atlantic to the point where that ocean river dives under the Gulf Stream, to be picked up there by the latter current and carried to the Shetland Islands?

It has often been urged that the American Indian came to the shores of the New World an unwilling voyager on the bosom of the Japan Current. Certain it is that all of these vast rivers of the ocean have played an incalculably important rôle in the affairs of the human race, and that a more exhaustive study of them than has yet been made holds many revelations in store.

DOES A SINKING SHIP GO TO THE BOTTOM?

One of the questions that is often asked is whether a ship, sinking in deep water, goes to the bottom, or whether she finds her level in some vertical depth zone and drifts on forever. This question sprang into great prominence when the *Titanic* went down and has been asked frequently during the present war. The answer is,

she goes directly to the bottom, else how could a dredge or a trawl be sent down five miles.

That same question was asked by the sailors on the *Challenger* while on its celebrated voyage during which material was gathered for fifty volumes about the sea. One of their number died and was buried in particularly deep water. They sent a delegation aft to ask those on the quarterdeck whether Bill would go to the bottom or would float around at some fixed level. They also wanted to know what Bill would be like when he got to the bottom.

WHEN SHIPS IMPLODE

One of the strange things that happen when ships sink is that implosions occur. These are inward burstings, often with a force as tremendous as the outward burstings caused by explosions of gunpowder. As the ship sinks into deep water, air-chambers that do not fill up are burst inward with a force proportionate to their resistance. If there be corked bottles in the stores that are not entirely full, the corks are driven in or the bottles burst.

With what force these implosions occur may be gathered from an experience of a scientific expedition. A thermometer was let down into very deep water, wrapped in protecting cloth. When the line was drawn up the cloth contained no thermometer. Instead it contained a lot of impalpable white stuff resembling snow. The implosion had not shivered the thermometer into the proverbial thousand pieces; it had simply transformed it into dust. Wood sent to the bottom of the deep places of the ocean has its very cells invaded and crushed and loses its buoyancy.

These are but a few outstanding phases of the wonders of the wonderful sea. They are only random paragraphs gathered from the remarkable chapters of the great Book of Nature that tells us of Old Ocean and his marvelous ways. The elder days of the becalmed mariners in the Doldrums are gone, and their amazing tales of Flying Dutchman and Wandering Jew, of ships that float about forever, bleached of canvas and rotten of rigging, with decks peopled by ghosts and skeletons—these are but classic myths, just as are the stories of corposants and monsters, recognized by all as such.

But the oceanographer has mysteries and problems to solve that make even the riotous imagination of the seasoned old salt seem tame in comparison. In the years ahead, America, with the Stars and Stripes gladdening every horizon, gleaming in every port, will vie with the maritime nations of Europe in promoting the efforts of the geographers of the sea to fathom its mysteries and increase its incomparable service to mankind.*

FOOD FOR OUR ALLIES IN 1919

By Herbert Hoover

United States Food Administrator

THERE is small prospect of a proper ending of the war before the campaign of the summer of 1919. Three and a half million fighting men of America, provided with the greatest mechanical equipment that has ever been given to any army, are being sent to France to attain that victory.

Even if Germany should suddenly collapse, however, and autocracy be completely overthrown sooner than now seems possible, the food problems of our Allies would remain unimproved, for America is the only quickly accessible reservoir available for the urgent needs of France, Belgium, Britain, Italy,

* The attention of the members of the National Geographic Society is called to an article on "The Gem of the Ocean: Our American Navy," by Josephus Daniels, Secretary of the Navy, in the Geographic for April, 1918, and to Rear Admiral Pillsbury's "The Gulf Stream," in the August, 1912, number.

Serbia, Greece, Roumania, and the famine-pinched neutrals of Europe. Peace or war, the American people are their Allied brothers' keepers, so far as food is concerned, for the next 12 months.

If autocracy is defeated in 1919, we will save a million American lives which will be expended if we are compelled to continue the struggle until 1920. To give this final blow in 1919 we have not only to find the men, shipping, and equipment for this gigantic army, but this army, the Allied armies, and the Allied civil populations must have ample food to maintain their strength.

We can do all these things, and I believe we can bring this dreadful business to an end if every man, woman, and child in the United States tests every action every day and hour by the one touchstone—does this or that contribute to winning the war?

SHIPS AND FOOD CLOSELY LINKED

The food program is no small part of this issue. To provide ships for our army, we have not only to build all that we can, but we must have the help of Allied shipping. In order that the Allies may provide this, they must take food ships from the more distant markets and place them upon the shorter run to the United States. We must decrease our imports of sugar, coffee, and tropical fruits.

Under these conditions, the demand upon us is for larger supplies. The conferences on food supply and shipping we have held in Europe enable us to estimate our burden. Compared with previous years, the Allied civilians and armies, our own armies, the Belgian relief, and certain neutrals who are dependent on us require the following round amounts from us:

	Average 3-year pre-war shipments	Shipped year ending July 1, 1918	Must ship year ending July 1, 1919	Increase this year over last year
	Tons	*Tons*	*Tons*	*Tons*
Meats and fats (beef, pork, dairy, poultry, and vegetable-oil products)	645,000	1,550,000	2,600,000	1,050,000
Breadstuffs (wheat and substitutes in terms of grain)	3,320,000	6,800,000	10,400,000	3,600,000
Sugar (from United States and West Indies)	618,000	1,520,000	1,850,000	330,000
Feed grains (mostly army oats)	950,000	1,950,000	2,700,000	750,000
Totals	5,533,000	11,820,000	17,550,000	5,730,000

Even this program means further self-denial by the Allies next year. They are making this sacrifice in the common cause. We must maintain the health and strength of every human being among them or they will be unable to put their full strength alongside our own in the supreme effort. At the President's direction, I have assured them that "in this common cause, we eat at a common table," and upon entering these conferences in Europe we promised them that whatever their war-food program called for from us we should fulfill.

If we survey our ability to meet this definite promise to them, we find that while our wheat production this year is better than last year our production of other cereals is less. We have had severe losses through drought in many sections. On balance our resources are no greater than last year. We find, however, that we can give this increase in food supplies, of 5,730,000 tons over last year, and still have a margin over the amount necessary to maintain our own health and strength.

OUR ALLIES DENY THEMSELVES TO TRANSPORT OUR TROOPS

At best the Allied table will be less than ours, for the Allied peoples are denying themselves more in order to transport our soldiers. We can do no less than fill the ships they send us.

Of our imports, we shall apparently have sufficient sugar to maintain the present consumption and take care of the extra drain of the Allies from our markets, instead of compelling them to send their ships to the Far East. We can secure in sailing vessels the coffee we need, if no one makes an overbrew.

Of our own products we must secure a reduction in consumption and waste in the two great groups of, first, breadstuffs,

and, second, meats and fats—that is, in all bread and cereals, beef, pork, poultry, dairy, and vegetable-oil products. The average consumption of our people of breadstuffs amounts to about six pounds per week and of meats and fats to four pounds a week for each person. A reduction in consumption of less than one-half pound per week per person in each of these two great groups of foods would accomplish our purpose.

We wish to emphasize, however, that we do not want curtailment in the use of milk for children.

GREATER SIMPLICITY OF LIVING A NATIONAL NECESSITY

Some of our homes, by reason of limited income, cannot now provide more food than they should have to maintain health in the family. They cannot rightfully be asked to make the suggested reduction in consumption. But the great majority of our homes can do more than suggested.

We need even greater simplicity of living than last year among all that section of the community to whom foodstuffs are a secondary item in expenditure.

We estimate that nearly 9,000,000 people eat at our public eating places—hotels, restaurants, boarding houses, clubs, dining cars, and so forth. The food consumption in these places is larger than in the average homes. We are asking the proprietors and employees of these institutions to undertake in many particulars a more strict program than last year, and we are confident that they will willingly do this.

NOT RATIONING, BUT PATRIOTIC COÖPERATION

This is not rationing—a thing we will never have if our people continue to support us as in the past. We are simply making an appeal to the intelligence in the homes and public eating places of America to work out for themselves the means and manner of saving.

This year, as last, I believe we can accomplish the necessary ends by voluntary action of our own people. The willingness to assume individual responsibility in this matter by the vast majority is one of the greatest proofs of the character and idealism of our people, and I feel it can be constantly relied upon. Our simple formula for this year is to further reduce consumption and waste of all food.

We have so arranged the international food program that, except for a moderate substitution of other cereals in bread, it will not, we hope, be necessary to substitute one foodstuff for another, nor to resort to wheatless and meatless days. What we need is to reduce directly our consumption of *all* foodstuffs, laying especial emphasis on the staples. The Allies are in need of all the surplus of the great staples that we can provide.

It is necessary that every family in the United States study its food budget and food ways to see if it cannot buy less, serve less, return nothing to the kitchen, and practice the gospel of the clean plate.

OUR GEOGRAPHIC MILITARY HOSPITAL WARDS

The need for increasing the number of National Geographic Society Wards in the American Military Hospital, No. 1, at Neuilly, Paris, described on a following page, is well worthy of your attention.

"I have an exclusive agreement for twenty-five years with the Victor to make records of my voice. The records made by the Victor process are far superior—in quality of tone natural reproduction, and in every detail—to those made by any other process in the world."

"As any true artist must realize, it is of great benefit to 'sit in the audience,' as it were, and be the critic at one's own performance. In this way I have learned a great deal from listening to my records on the Victrola and can truly state that it has been my best teacher."

"I wish to express my appreciation of the splendid series of reproductions of my voice which the Victor Company has made. They seem to me remarkably lifelike and faithful."

"The reproductions of the Victor Records are *wonderful*. It is my great desire now to seal up and preserve a complete set of my Victor Records for my children."

"I am delighted to contribute a word of appreciation in favor of the Victor, and congratulate myself that my selections are brought before the public in so admirable a manner, by means of its wonderful merit."

Who knows more about music than the world's greatest artists!

What they think of the Victor

When selecting a musical instrument for your home, wouldn't you value the opinions of the world's greatest artists? Wouldn't you like to benefit by what they think of it?

Certainly no one is better qualified to judge a musical instrument! They know music. Their life-work is music. And what they say about the Victrola is of the utmost importance.

They not only endorse the Victrola, but they show their unbounded confidence in it by making Victor Records exclusively.

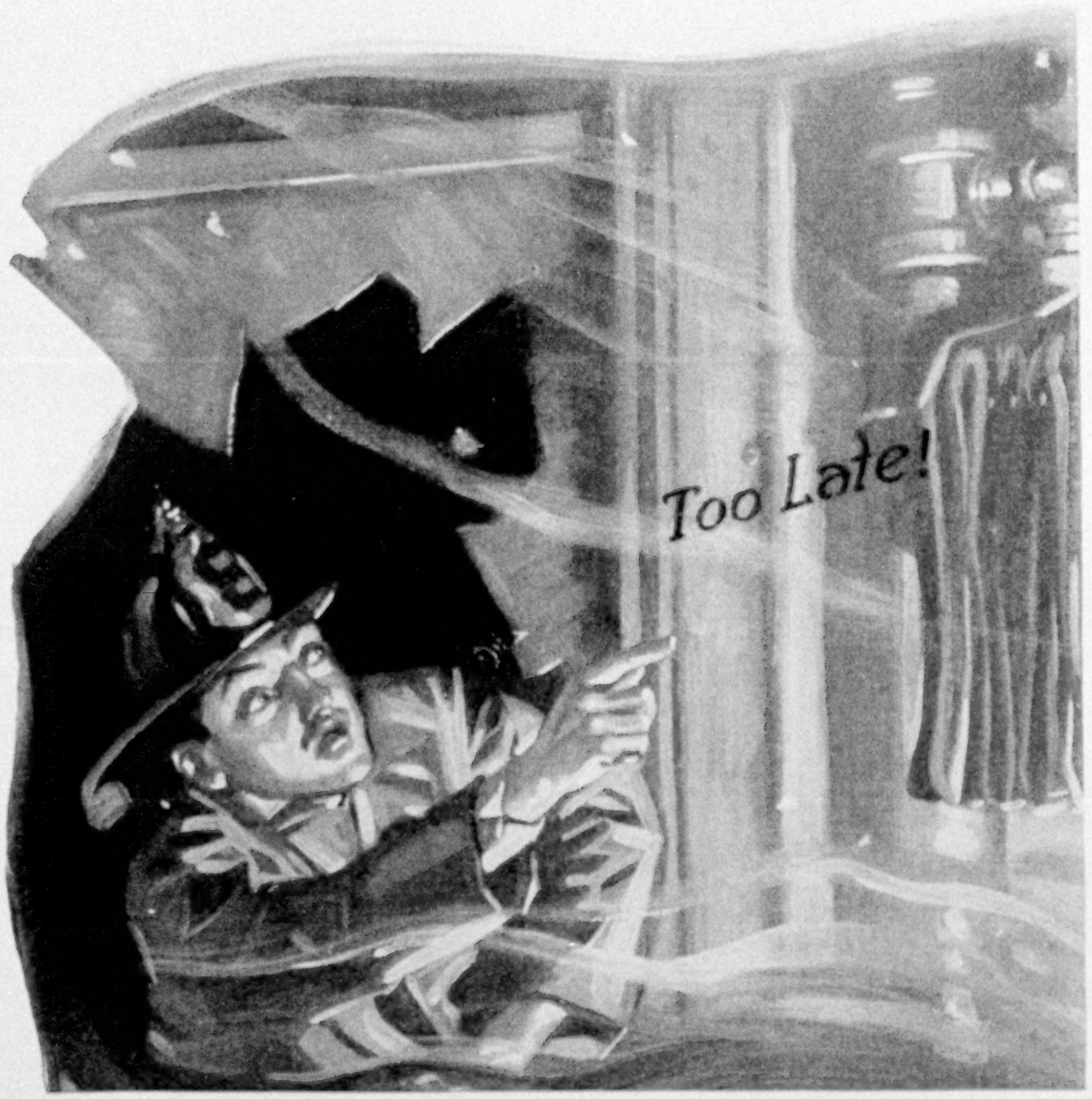
There are Victor dealers everywhere, and they will gladly play any music you wish to hear and demonstrate the various styles of the Victor and Victrola—$12 to $950 Saenger Voice Culture Records are invaluable to vocal students—ask to hear them.

Victor Talking Machine Co., Camden, N. J., U. S. A.

Berliner Gramophone Co., Montreal, Canadian Distributors

Victor Supremacy

"The Victor today is the most relentless but the most just critic, as it reproduces absolutely what the artist has done."



The fireman was not to blame

A GOING business is burning up!

Why doesn't the fire-bucket hop off the shelf and hurl its wet contents into the heart of the oncoming fire?

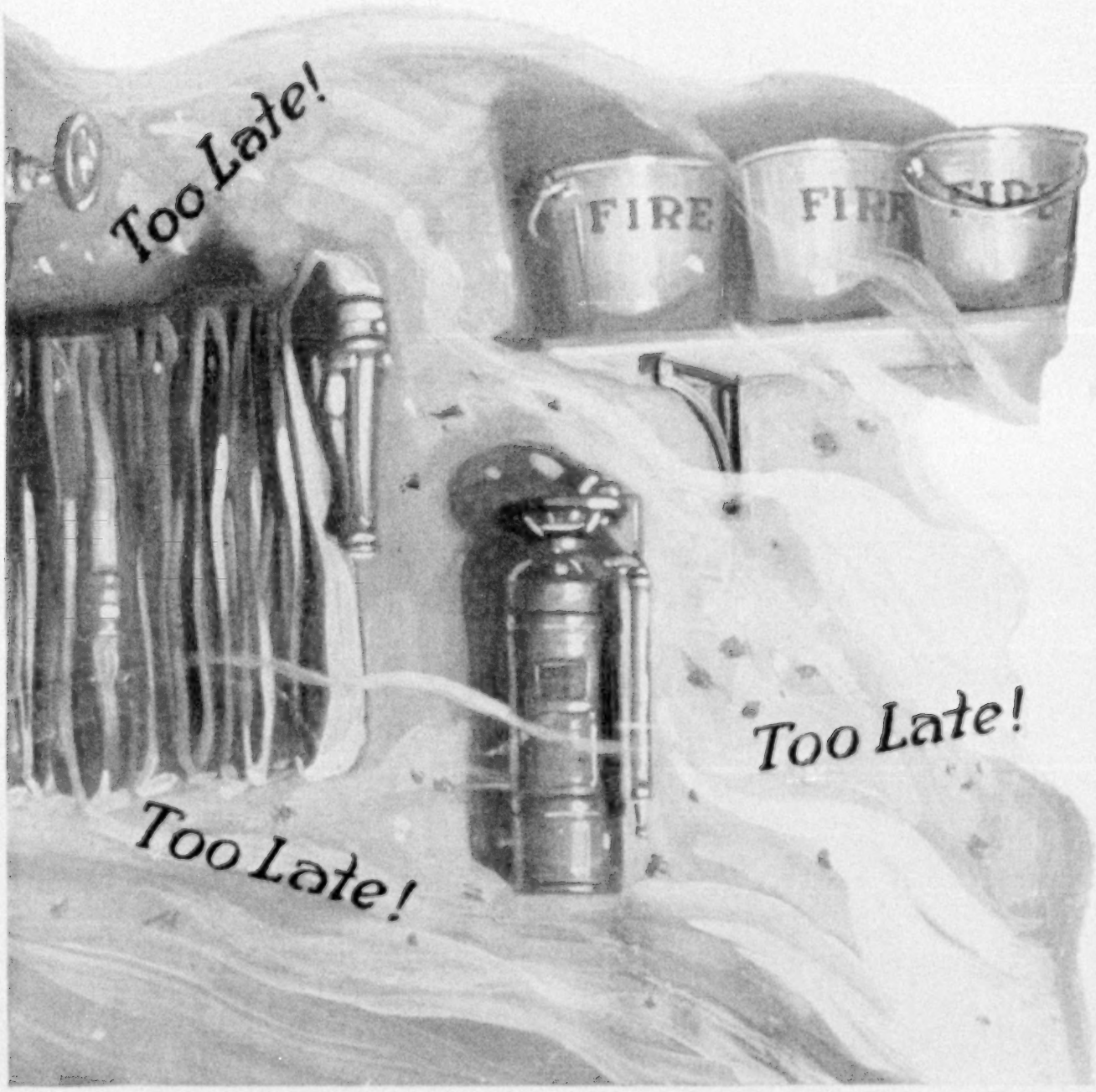
Why doesn't the stand-pipe hose unroll itself and the big valve automatically turn on the water?

Why doesn't the chemical-extinguisher tip itself upside down and pump itself dry?

That is what you think when you realize your business is being burned up. What you then want, to save your business, is *something* that will jump into action on its own hook, as if your business salvation was worth an effort.

Apparatus that depends on the human element will fail ninety-five times out of one hundred, says a great ex-fire chief of New York City.

Fire-buckets, hose, and chemicals are all right if somebody is there to use them. Fireproof walls, metal trim, metal furniture,



iron shutters, wire-glass, etc., are also valuable aids. But they can't put out a fire. That's the reason why all of them *combined* do not make a business as safe from fire as a Grinnell Automatic Sprinkler System does *alone*, nor earn as low an insurance rate.

Grinnells frequently reduce the insurance rate by two-thirds. For this reason a Grinnell System really costs nothing in the long run, and generally pays for itself in a few years by its own savings on insurance.

Even if you carry double the insurance you do, you would be the loser if your business were swept away by fire. One short hour of fire would set you back, disrupt your organization, cancel a lot of your profits.

That's why business men of America have put 25,000,000 Grinnell Sprinkler-heads on guard over their going businesses.

We can give you a few pertinent ideas about your own property if you will tell us your floor space, your insurance rate, and the amount of insurance carried.

Don't theorize—get the figures! Address the General Fire Extinguisher Company, 293 West Exchange Street, Providence, R. I.

XUM

Any Way—Any Time
White House Coffee and Teas

"None better at any price"

The meal is judged by the coffee you serve. Under all conditions and on all occasions White House Coffee gives pleasure and commands respect. Always sold in the air-tight, all-tin cans—never in bulk.

White House Tea is superb. It has a quality as distinct and superior as White House Coffee. *Five favorite* varieties in 1-4 and 1-2 lb. cans. Order by name "White House." Decline substitutes.

DWINELL-WRIGHT CO.
Principal Coffee Roasters
BOSTON CHICAGO

DUES

Annual membership in U. S., $2.00; annual membership abroad, $3.00; Canada, $2.50; life membership, $50. Please make remittances payable to National Geographic Society, and if at a distance remit by New York draft, postal or express order.

RECOMMENDATION FOR MEMBERSHIP

IN THE

NATIONAL GEOGRAPHIC SOCIETY

The Membership Fee Includes Subscription to the National Geographic Magazine

PLEASE DETACH AND FILL IN BLANK BELOW AND SEND TO THE SECRETARY

.....191

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest,
Washington, D. C.:

I nominate .....

Address .....

.....

for membership in the Society.

.....

.....
Name and Address of Nominating Member

When Belgium Stemmed the Tide

Four years ago the Belgian Army, war-worn and weak in numbers, confronted the Germans on the Yser. From Liege to the last narrow strip of their country they had resisted the invaders inch by inch, glorious even in retreat.

At the Yser the Belgians performed a signal service to the Allied cause by holding the Germans while the gaps were being closed in the Franco-British line to the rear.

Four years have passed, and the same nations are still at death grips along the Western front. America, too, is there, and has this opportunity because the Belgians kept the enemy from crossing the Yser long ago.

The same unfaltering courage, the same inspiration for sacrifice in our army abroad and in our citizens at home will give us victory.

The complete mobilization of the whole people is necessary and the telephone service has an increasingly important part in speeding the national effort.

More than 12,000 members of the Bell System are in military service. Those that remain at home must fill the gaps and do their utmost, with the co-operation of the public, to help win the war.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy *One System* *Universal Service*

W.S.S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

"Mention the Geographic—It identifies you."

XUM

Photograph by H. T. Ellis, Paris

A Tribute to a Sleeping Hero: In the National Geographic Society Wards

National Geographic Society Wards in the American Military Hospital No. 1, Neuilly, France

PICTURE TO YOURSELF the feeling of one of our fellow-members or his boy upon being brought into this hospital and placed in a comfortable bed provided for him by his own friends. Can you imagine a better tonic or a more comforting thought to a sick or wounded man than the realization that he is almost at home?

Thousands of members of the National Geographic Society and the sons of a great many more have answered our country's call to arms. Numbers have already gone to France, and others will follow shortly to place the Stars and Stripes side by side with the battle standards of our allies in this titanic struggle for freedom and everlasting peace.

There will be no overhead expense in the handling of the National Geographic Society's fund, and every dollar will be expended for equipment and maintenance of the ward.

No matter how small or how large your subscription, it will be welcome and proper acknowledgment made. For particulars read "A Day in the Geographic Wards," by Carol Corey, in the July issue of the Geographic.

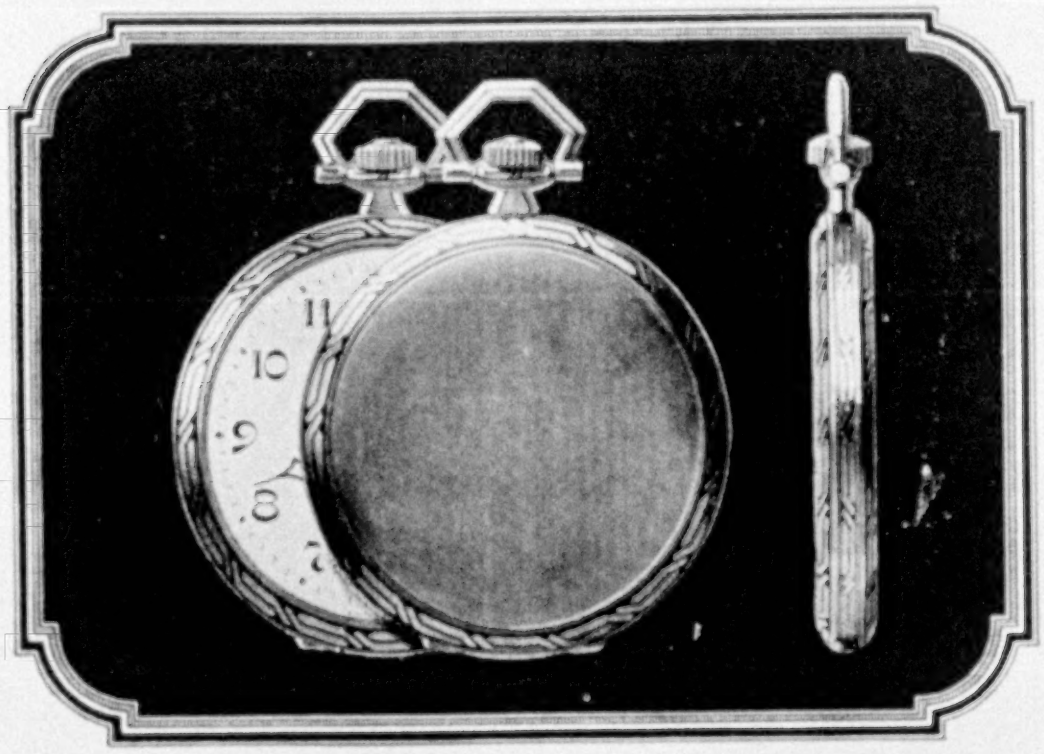
(CUT HERE)

GILBERT GROSVENOR,
Chairman, National Geographic Society Ward Fund,
16th and M Streets N. W., Washington, D. C.

I enclose $.....toward the National Geographic Society Wards (twelve beds each) in the American Military Hospital No. 1, Neuilly, France. Two wards have already been established.

(Name).....

(Address).....



No. V514G Enamel Inlaid, chased center, Gruen Verithin model. Solid green gold, $100 to $250

MASTERPIECES OF SWISS CRAFTSMANSHIP

Made and sold under the management of an American organization

THE Gruen movements, famous among horologists for their precision time-keeping, are made under American ownership in Madre-Biel, Switzerland, by a modern guild of that country's best craftsmen.

The movements are then brought to the Guild Workshop in America, at "Time Hill," Cincinnati. Here the beautiful Gruen cases are hand wrought and in them the movements adjusted and timed.

When you own a watch with the name "Gruen" on the dial, you own the finest modern example of Swiss watchmaking art—with the complete service of an American organization behind it.

The Gruen Watch is obtainable only through one of 1200 Gruen jeweler agencies—the best in every locality—to whom the sale is confined. Duplicate repair parts may be had through these agencies at all times.

How the Gruen Pat. Wheel Construction made an accurate watch thin. The shortness of staff makes watch more durable.

Fixed Prices

Gruen Verithins	$80 to $200	Ultrathins	$225 to $350
Very Verithins	40 to 225	Dietrich Gruens	300 to 765

Owing to war conditions, prices quoted are subject to change without notice.

GRUEN WATCHMAKERS' GUILD, Dept. D-4, "Time Hill," Cincinnati, O.

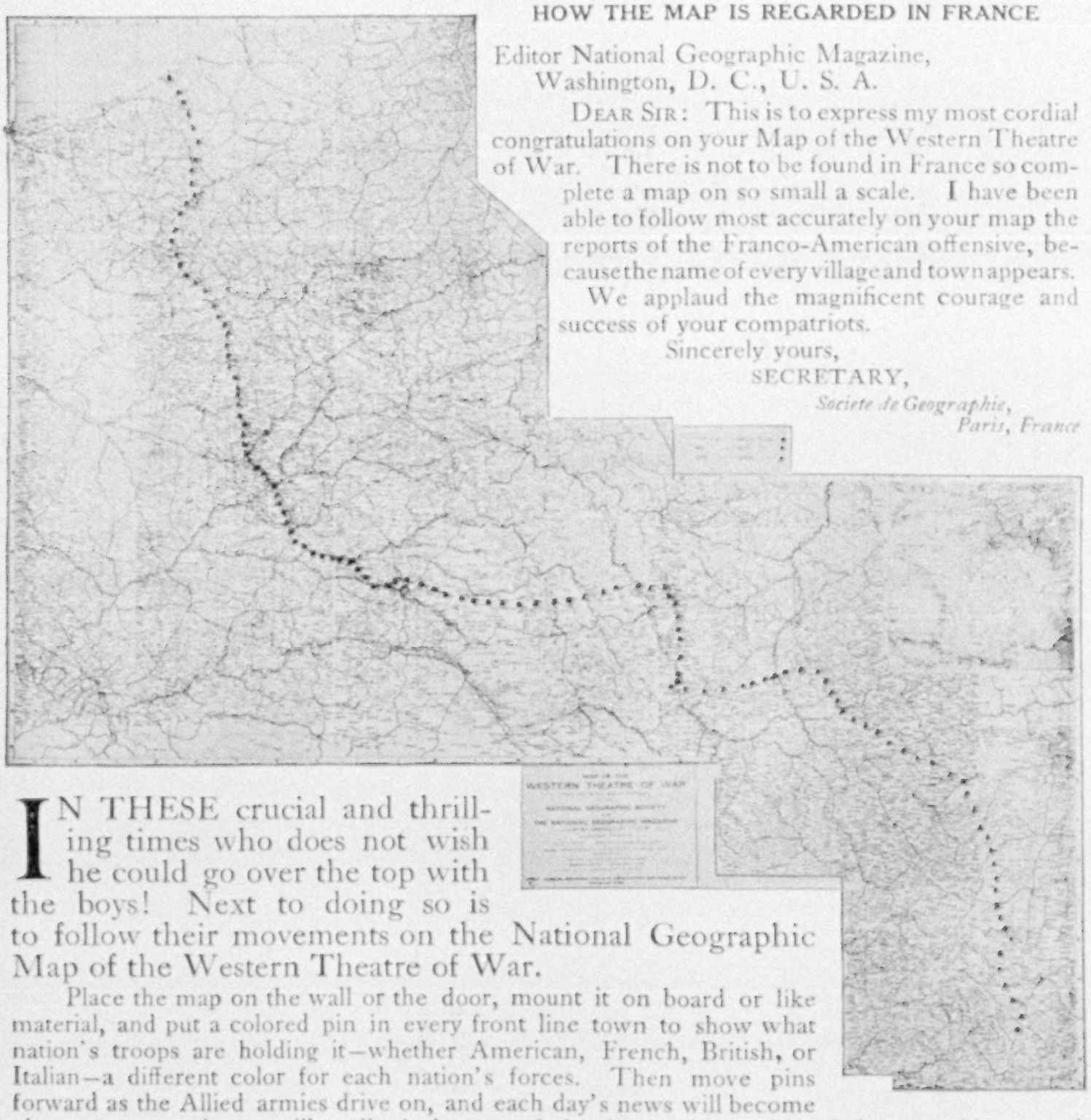
Makers of the famous Gruen Watches since 1874. Canadian Branch, Toronto, Canada

GRUEN Verithin and Wrist WATCHES

XUM

To Follow Our Boys to the Rhine

Use the Map of the Western Theatre of War



HOW THE MAP IS REGARDED IN FRANCE

Editor National Geographic Magazine,
Washington, D. C., U. S. A.

DEAR SIR: This is to express my most cordial congratulations on your Map of the Western Theatre of War. There is not to be found in France so complete a map on so small a scale. I have been able to follow most accurately on your map the reports of the Franco-American offensive, because the name of every village and town appears.

We applaud the magnificent courage and success of your compatriots.

Sincerely yours,
SECRETARY,
Societe de Geographie,
Paris, France

IN THESE crucial and thrilling times who does not wish he could go over the top with the boys! Next to doing so is to follow their movements on the National Geographic Map of the Western Theatre of War.

Place the map on the wall or the door, mount it on board or like material, and put a colored pin in every front line town to show what nation's troops are holding it—whether American, French, British, or Italian—a different color for each nation's forces. Then move pins forward as the Allied armies drive on, and each day's news will become clear to you, and you will really feel a part of the forces that are headed inexorably toward Berlin. The 70-page index of all names on the fighting front is so arranged and keyed that you can quickly locate any and all of them.

Dept. H, National Geographic Society,
16th and M Streets, Washington, D. C.

Please send_____ copies of "MAP OF WESTERN THEATRE OF WAR," with Index Book of 12,000 names, for which I enclose herewith_____ dollars. Postpaid in United States.

If several copies are desired, write names and addresses and send with your card.

Printed on Military Linen, $1.50, postpaid in U. S. A.
Printed on Paper, 75 cents; Abroad, 25 cents additional.
Index without Map, 25 cents.

Name_____

Street Address_____

City and State_____

Why Teeth Lose Their Glitter

All Statements Approved by High Dental Authorities

You Leave the Film

Why do well-brushed teeth discolor and decay?

Why does tartar form?

Why does pyorrhea start?

Millions of people are asking those questions, and the answer is this:—

A slimy film constantly forms on your teeth. It clings to the teeth. It gets into crevices, hardens and stays, and your brushing doesn't remove it. And most tooth troubles are due to that film.

That film is what discolors—not your teeth. It hardens into tartar. It holds food which ferments and forms acid. It holds the acid in contact with the teeth to cause decay.

Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea, and many internal troubles are due to them.

These facts have been known for years. But dental science found no way to effectively combat the film. A vigorous dental cleaning from time to time was needed to remove it.

Now a way has been found to combat it. That way is embodied in a dentifrice called Pepsodent. You can prove it, as thousands have, by a simple one-week test. This is to urge that you do it—at our cost.

See the Difference

Pepsodent is based on pepsin, the digestant of albumin. The film is albuminous matter. The object is to dissolve the film, then to constantly prevent its accumulation.

Ordinary pepsin will not serve. It must be activated, and the usual agent is an acid harmful to the teeth.

But science has now found a harmless activating method. Five governments have already granted patents. That method, employed in Pepsodent, makes teeth-cleaning vastly more effective.

Able authorities have made clinical tests of Pepsodent. In thousands of cases they have watched its efficiency. Now we are urging all people to prove it in their homes. It means results you do not get without it, and they are all-important.

Send the coupon for a One-Week tube. Use it like any tooth paste. Note how clean your teeth feel after using. Mark the absence of the slimy film. See how teeth whiten as the fixed film disappears.

That film is your teeth's chief enemy. One week will show you that you can combat it. Then you will always clean your teeth, we think, in this scientific way. Cut out the coupon now.

Return your empty tooth paste tubes to the nearest Red Cross Station

Pepsodent PAT. OFF. REG. U. S.

The New-Day Dentifrice

A Scientific Product—Sold by Druggists Everywhere

(136)

One-Week Tube Free

THE PEPSODENT CO.,
Dept. 204, 1104 S. Wabash Ave.
Chicago, Ill.:

Mail One-Week Tube of Pepsodent to

Name .....

Address .....

XUM

Descriptive Text by Edward W. Nelson, America's Foremost Authority on Animals

127 Paintings of the Mammals of North America in Full Colors by Louis Agassiz Fuertes

50 Reproductions of Animal Tracks Drawn by Ernest Thompson Seton

A Series of Drawings of American Prehistoric Mammals by Charles R. Knight

32 Black and White Pictures from Unusual Photographs of American Wild Life

INTRODUCING A LITTLE BLACK BEAR TO A LITTLE BROWN BEAR AT SEWARD, ALASKA

Wild Animals of North America

Intimate Studies of the Big and Little Citizens of the Mammal Kingdom

More than 200 illustrations: 127 Paintings reproduced in full colors; 50 Track Sketches, a number of Drawings of Prehistoric Mammals and many illustrations from unusual photographs reproduced in black and white.

THERE is no subject richer in fascinating interest than the study of animal life. To see all the types and representative species in their native environment, to watch them meeting their respective problems of life and adapting themselves to the conditions they have to face, and to follow nature through its many moods as typified by its wonderful variety of mammalian forms is a delightful and informative diversion.

To do this under the guidance of one of those born observers, whose eyes are always open, whose ears are always keen, whose brain is always quick to grasp, and whose pen is ever facile, is to become intimately acquainted with one of the richest chapters in zoölogy.

Such is to be the good fortune of those who receive a copy of the National Geographic Society's new Book of Mammals. This work is the consolidation of Edward W. Nelson's splendid nature articles in the GEOGRAPHIC.

There is no man so well fitted to introduce you to the mammals of North America as Mr. Nelson, the Chief of our remarkable U. S. Biological Survey. For forty years he has been their friend, living among them and studying their habits and traits in the most intimate way. To him an animal is something more than flesh and bone and skin and fur. It has a personality; and he is as careful to record this as to describe the formal qualities which science writes down in species descriptions.

Mr. Nelson is a naturalist of the John Burroughs order. To visit the people of woodland, mountain, and field with him is to discover a new world.

Illuminating the descriptions are natural-color illustrations from the brush of that gifted artist-naturalist, Louis Agassiz Fuertes. Mr. Fuertes is not only a master of color but also of pose, and he can catch the timid alertness of the prong-horn antelope, the cruel sagacity of the arctic wolf, the lazy indifference of the common skunk, or the wide-awake watchfulness of the gray squirrel, with equal facility.

Added to these is a series of 50 sketches by Ernest Thompson Seton, depicting the footprints of various animals as they appear in the light snow of field or forest or in the dust of the wayside. These will enable the reader to identify the tracks of many of the mammals of North America.

Together these authorities have produced a book that is without counterpart in the literature of animal life.

CUT ON THIS LINE

DEPT. H, NATIONAL GEOGRAPHIC SOCIETY, ..., 1918
16th and M Streets, Washington, D. C.

Please send.....copies of "WILD ANIMALS OF NORTH AMERICA," bound in.....
for which I enclose herewith.....dollars.

If several copies are desired, write names and addresses and send with your card.

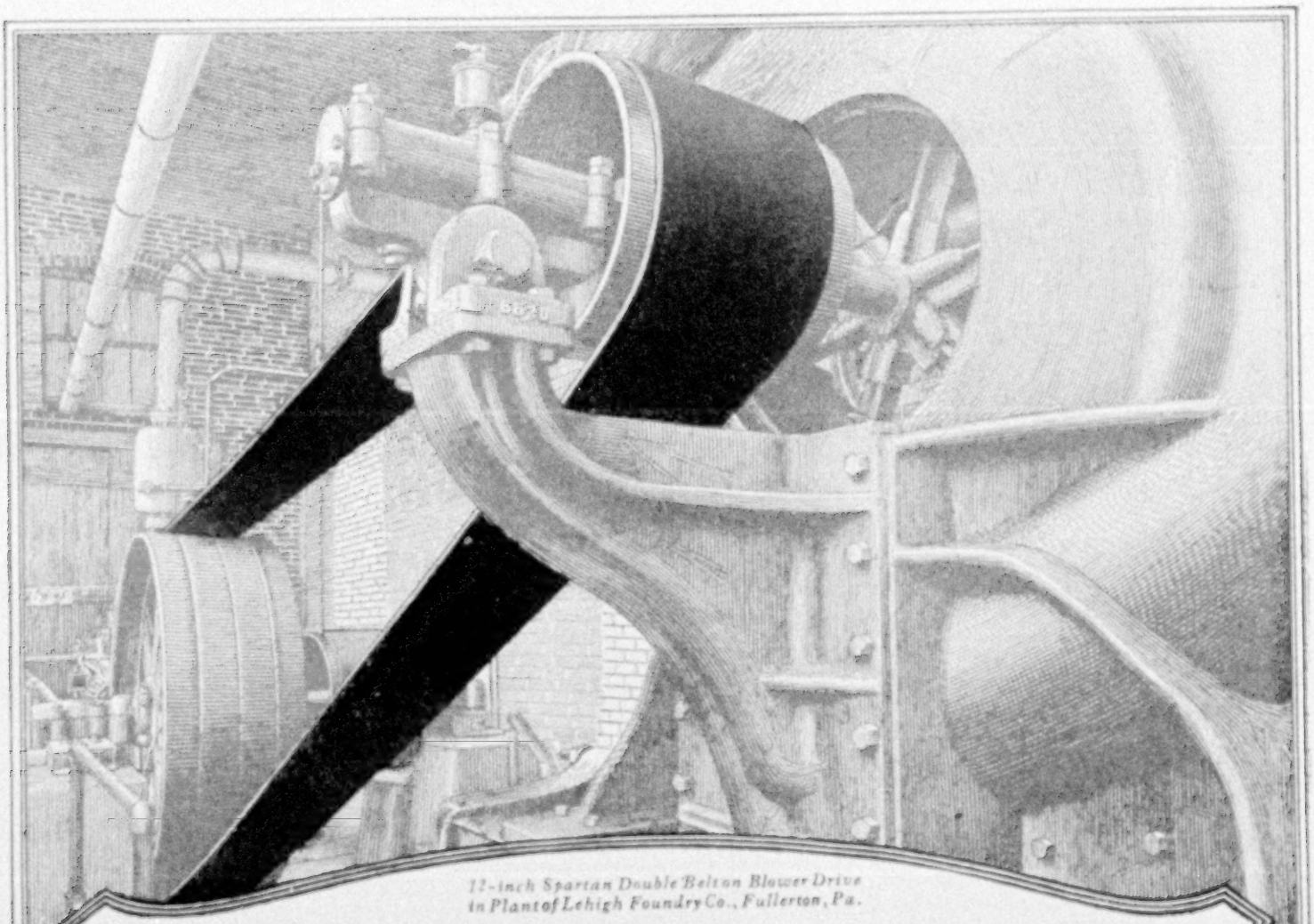
Bound in Royal Buckram (Stiff Covers) or Military Khaki (Flexible Covers), postpaid in U. S., $3.00

Name.....

Street Address.....

City and State.....

9-13



12-inch Spartan Double Belt on Blower Drive in Plant of Lehigh Foundry Co., Fullerton, Pa.

High Speed

The demand on belts varies enormously. Some must loaf along with light loads; some run slowly and some run quickly with heavy loads; and some must contend with trying conditions like steam, fumes, or exposure to heat.

For each and every set of power requirements the Graton and Knight Standardized Series leather belting presents a belt made specifically for this purpose.

Blower belts that rush along a mile a minute must have great elasticity, high surface traction and must stand up under trying conditions. For this exacting work, the Graton & Knight Spartan Belt, with its wonderful elasticity and pulley-grip, is ideal. It resists conditions of exposure, heat, steam, chemical fumes that cause most belts to disintegrate.

It is a fine example of the benefit of Standardization applied in belt making. Write for book on Standardization.

THE GRATON & KNIGHT MANUFACTURING CO., Worcester, Mass., U.S.A.

Oak Leather Tanners, Makers of Leather Belting, Lace Leather, Packings and Specialties

Branches and Distributors in all Principal Cities

GRATON AND KNIGHT

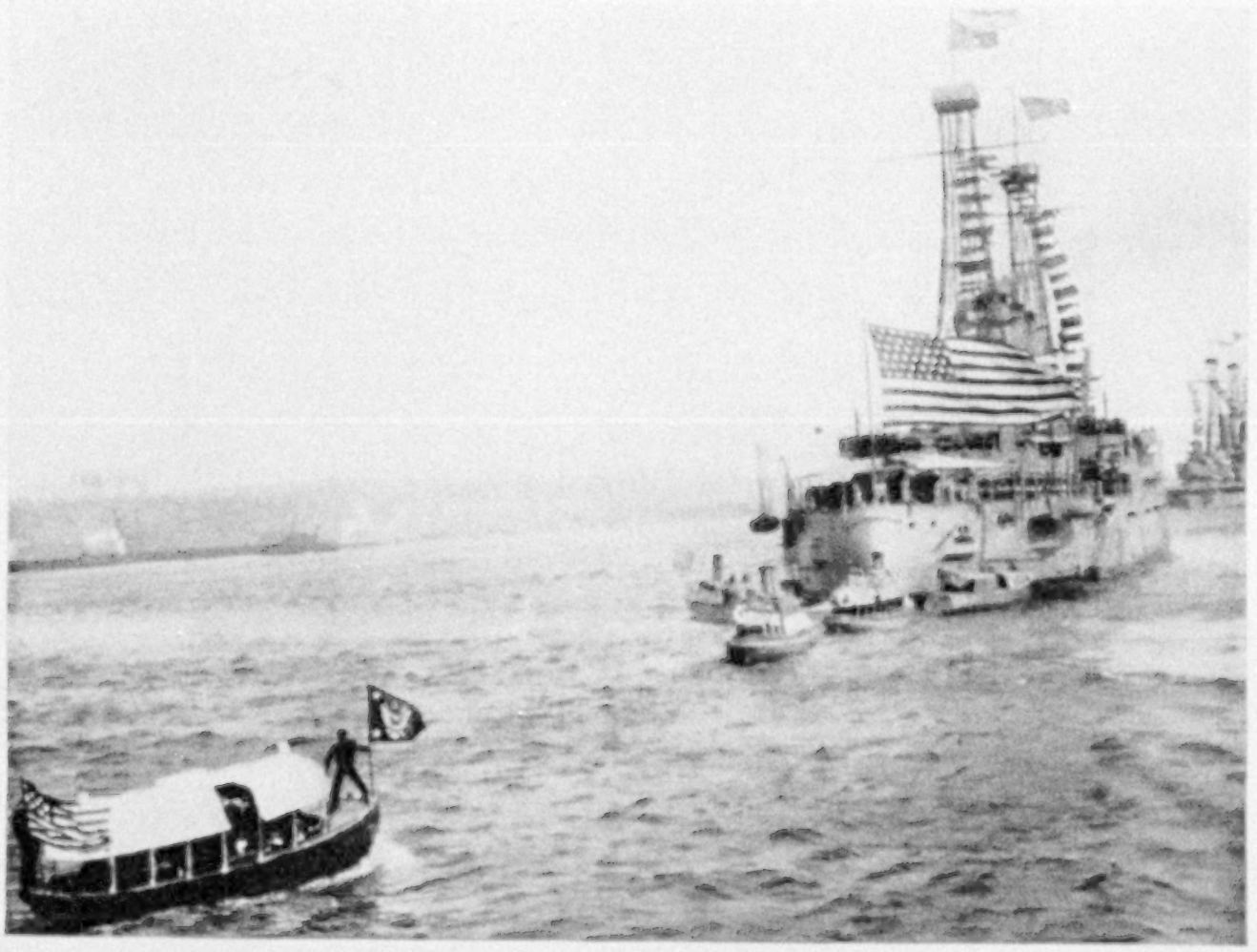
GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use

XUM



THE PRESIDENT VISITS THE FLAGSHIP: HIS FLAG FLIES AT THE BOW OF THE BARGE

Flags of the World

By Commander BYRON McCANDLESS and GILBERT GROSVENOR

A HANDSOMELY BOUND VOLUME of 150 pages, containing 1,200 flags in their full colors, 300 illustrations in black and white, the complete insignia of the uniformed forces of the United States, the international flags in use on land and sea, together with an epitomized history of each flag, and an authoritative history of the "Star Spangled Banner." In this book there are published for the first time the flags of each of the forty-eight United States in full colors and with complete descriptions based on original research and approved by the State officials.

The Federal Government put all of its resources at the command of the National Geographic Society in order to insure the correct reproduction of every military and naval flag in its proper design and coloring. The same coöperation was given by the Embassies and Legations of all the friendly countries represented. No complete collection of Pan American flags hitherto published has been correct, and the same is true of Asiatic flags.

This flag book is as authoritative as an official report, as delightful as fine fiction, and as beautifully illustrated as a gem of the printing art can be. Bound in stiff royal buckram, it is being placed in thousands of home libraries and is a gift par excellence.

Our military and naval forces find "Flags of the World" extremely useful, containing, as it does, the most complete and recent information on the important subject of flags and signals. Every soldier and sailor is glad to have one of these books, and to make them most suitable for this purpose a special edition has been printed on water-proof paper and bound in a FLEXIBLE KHAKI cover, which will stand the wear and tear of every-day use in the field or on board ship. This is a gift your boy in his country's service will appreciate.

CUT ON THIS LINE

Dept. H, National Geographic Society,
16th and M Streets, Washington, D. C. _____ 1918

Please send _____ copies of "FLAGS OF THE WORLD," bound in _____

for which I enclose herewith _____ dollars.

If several copies are desired, write names and addresses and send with your card.

Bound in Royal Buckram (Stiff Covers) or Military Khaki (Flexible Covers), postpaid, $2.00

Name _____

Street Address _____

City and State _____

9-18

"—and use this powder for your tender, bleeding gums"

Only dentists understand the real dangers of neglect in caring immediately and properly for spongy, tender, bleeding or receding gums—warning signals of pyorrhea.

Pyorrhea attacks and destroys the gum tissues and bony sockets which hold the teeth in place. Mastication becomes painful; the gums ache and bleed; teeth loosen and eventually fall out; the general health is affected by the bacteria developed under pyorrhetic conditions.

Pyorrhocide Powder is the preparation most widely prescribed by dentists to *prevent* pyorrhea and to aid in *restoring* affected gums to a normally healthy condition. As a part of the Dentinol and Pyorrhocide Method, Pyorrhocide Powder has demonstrated its value in maintaining gum vitality and in correcting all unhealthy conditions which lead to pyorrhea.

The Dentinol and Pyorrhocide Method originated in the Pyorrhocide Clinic, New York, ten years ago. A staff of scientific investigators and dental specialists devoted many years to studying the causes and effects of pyorrhea and how it could be prevented and treated successfully. Dentinol, to be applied by the dentist, and Pyorrhocide Powder, to be used at home, were developed.

Since 1908 dentists from all parts of the world have been instructed in the application of the method. It is being used successfully by thousands of dentists.

Pyorrhocide Powder's effectiveness is due to the presence of Dentinol in combination with other healing ingredients. Used twice daily, Pyorrhocide Powder acts quickly and surely. It relieves tenderness; heals bleeding gums. Spongy gums are made hard and firm. Their power of resistance against pyorrhea infection is increased.

Pyorrhocide Powder retards tartar formation. It cleans and polishes the teeth.

Tooth, gum and mouth health can be maintained only by co-operating with a dentist and by the regular use, twice daily, of a medium like Pyorrhocide Powder compounded to meet the requirements proved essential by years of scientific research and clinical experience.

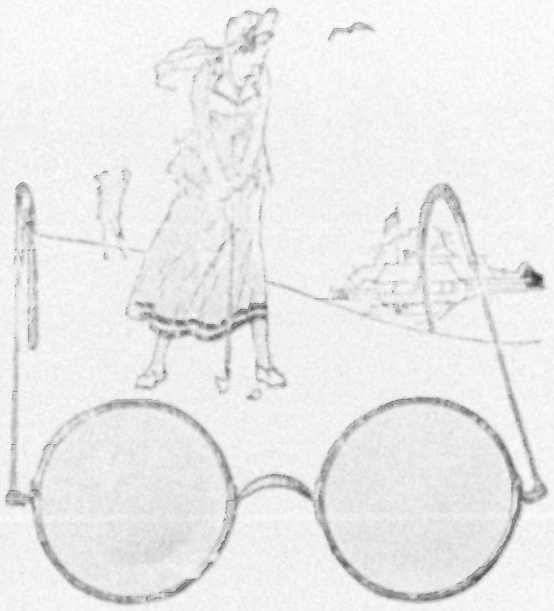
Pyorrhocide Powder is economical because a dollar package contains six months' supply. For sale by all dental supply houses and good drug stores.

THE DENTINOL & PYORRHOCIDE COMPANY, Inc.
1478 BROADWAY, NEW YORK CITY

Sold for years exclusively upon the recommendation of the dental profession. Effective not only in the treatment of pyorrhea but also in its prevention, when used regularly as a dentifrice.

Send for Free Sample and Booklet

Upon request we will send you a sample of Pyorrhocide Powder, together with our educational booklet on the causes, effects, treatment and prevention of pyorrhea.



Shelltex Rimmed

Shur-on

EYEGLASSES AND SPECTACLES

For Outdoors, Too

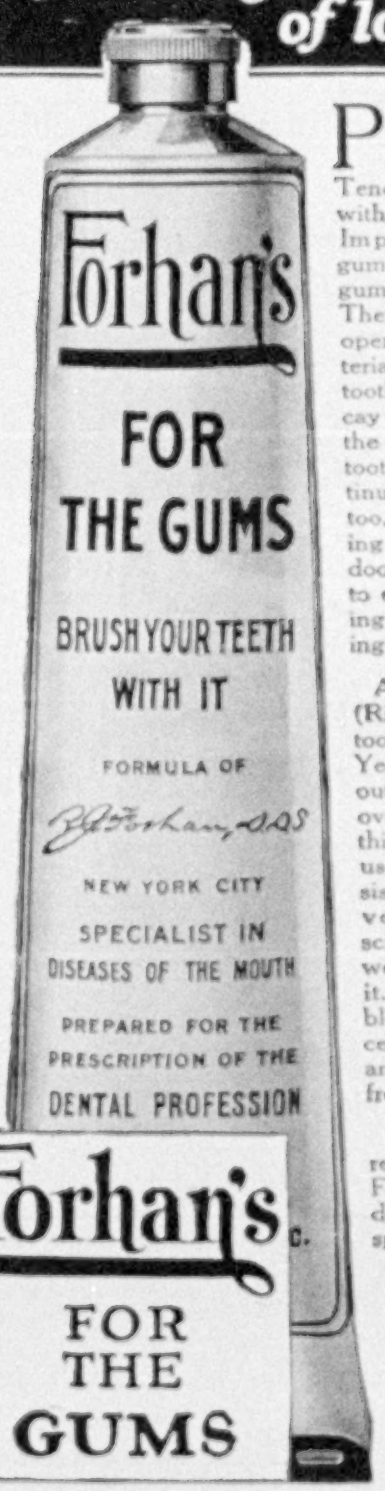
YOU can't "keep your eye on the ball" if you're conscious of your glasses. Shelltex Shur-ons stay on comfortably, and are as good-looking as they are serviceable.

It will pay you to insist on the genuine, which always bear the name Shur-on or Shelltex in the bridge. They cost no more.

E. KIRSTEIN SONS CO.
249 Andrew St., Rochester, N.Y.

Makers of rimmed and rimless Shur-on eyeglasses and spectacles. Established 1864.

Inflamed gums—a cause of loose teeth



PYORRHEA is undoubtedly a vital danger to both gums and teeth. Tender gums indicate it, and with it come loosening teeth. Imperceptibly at first, the gums recede from the normal gum line. They inflame. They present many tiny openings for millions of bacteria to attack the unenameled tooth base. Tooth-base decay quickly follows. Even if the cavity be filled and the tooth saved, the gums continue to recede. Remember, too, that inflamed and bleeding gums act as so many doorways for disease germs to enter the system—infecting joints or tonsils—or causing other ailments.

Against this Pyorrhea (Riggs' Disease) ordinary tooth pastes are powerless. Yet Pyorrhea attacks four out of five people who are over forty, and many under this age. But Forhan's—if used in time and used consistently—positively prevents Pyorrhea. It is a scientific tooth cleanser as well. Brush your teeth with it. See how promptly bleeding or gum tenderness ceases and how your teeth are kept white, clean, and free from tartar.

If gum-shrinkage has already set in, start using Forhan's and consult a dentist immediately for special treatment.

30c and 60c tubes.
All Druggists.

FORHAN CO.,
214 6th Ave., N. Y.
Send for Trial Tube Free.

W.S.S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

It takes labor and material to produce the articles you buy.

When you buy articles you do not need, there is that much less labor and material to produce the articles needed for our fighting forces; there is not enough for both.

By saving food, fuel, and all other things not required to maintain your health and efficiency, you release labor and material for the use of the Government.

If you want to win this war—SAVE—and lend your money to the Government by buying War Savings Stamps.

Every $4.22 invested in November, 1918, gives you $5.00 on January 1, 1923.

Buy more War Savings Stamps now!

W.S.S.
WAR SAVINGS STAMPS
ISSUED BY THE
UNITED STATES
GOVERNMENT

THIS SPACE CONTRIBUTED BY NATIONAL GEOGRAPHIC SOCIETY

U. S. Army or Navy
Red Cross, Y. M. C. A., and Allied Organizations

Letters of Credit are the safest and most convenient medium for carrying funds.

During the war we are issuing such Credits, ***free of commission,*** to officers and men in the U. S. Army and Navy, and to those engaged in Red Cross, Y. M. C. A., and allied organization work.

We have also sent our American representative to France for the convenience of our friends, with headquarters at the office of the Credit Commercial de France, 20 Rue Lafayette, Paris.

BROWN BROTHERS & CO.
Philadelphia NEW YORK Boston

BROWN, SHIPLEY & COMPANY
Founders Court, Lothbury — Office for Travelers
LONDON, E. C. — 123 Pall Mall, LONDON, S. W.

DENBY
MOTOR TRUCKS

THE tasks of war and peace alike find the same efficient performance in the Denby.

Denby Motor Truck Company
Detroit, Michigan

Envelope and Stamp Moistener

Sometimes a practical gift is worth its weight in gold. This *Stamp* and *Envelope Moistener* is useful, handy and sanitary—always ready to do what you should not do. San-i-tary Moistener in ground glass container, with enamel top, is suitable for home or office. Boxed with gift card and sent postpaid for 85 cents. One of the many practical things at small cost shown in our year book of Thrifty Gift Giving. Send for it.

Pohlson GIFTS

No. 1913
85c

POHLSON GIFT SHOP, PAWTUCKET, R. I.

JUDD & DETWEILER, INC.
MASTER PRINTERS
420-422 ELEVENTH ST. N. W.
WASHINGTON, D. C.

Salt Mackerel
CODFISH, FRESH LOBSTER

FOR THE CONSUMER — NOT THE DEALER

FOR YOUR OWN TABLE

FAMILIES who are fond of FISH ought to get them DIRECT from GLOUCESTER, as no inland dealer anywhere else can possibly be in a position to offer you goods as perfect and wholesome as we can.

We sell ONLY to the CONSUMER DIRECT, not through grocers or markets. We want to supply YOU, no matter how small your requirements.

We have done a mail-order fish business for thirty years, sending the goods RIGHT TO OUR CUSTOMERS' HOMES, EXPRESS PREPAID EAST OF KANSAS, and guaranteeing complete satisfaction or money refunded.

If you are interested in good fish, won't you drop us a postal that we may send you further information?

Our SALT MACKEREL are tender, juicy fellows—broiled for breakfast they are delicious. SALT CODFISH selected and prepared by our method is unexcelled.

Much of the fresh fish you buy in the market is at least several days old. OUR CANNED FISH, being STEAM STERILIZED, is ABSOLUTELY FRESH.

Our FRESH LOBSTERS, in parchment-lined cans, go through no process except boiling (no preparation of any kind being used). Opened and packed solid in whole pieces as soon as taken from the water, they retain their crispness and natural flavor. CRABMEAT, SHRIMP and CLAMS have likewise a perfectly natural appearance and taste.

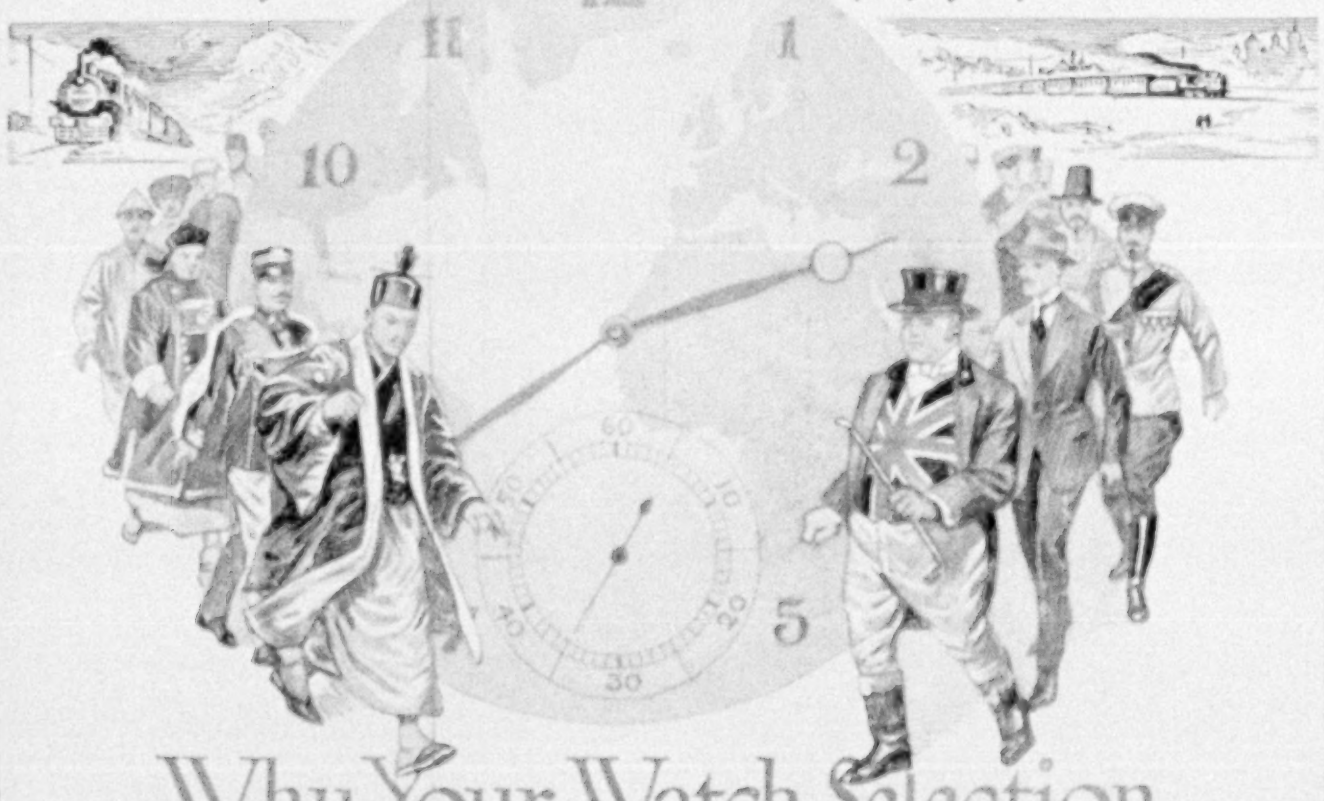
Our SALMON, TUNNY and IMPORTED FISH DELICACIES are always the best produced.

A selection of our FISH PRODUCTS should always be in your STORE-ROOM for daily use and for the preparation at a moment's notice of dozens of dainty or substantial dishes.

Send for Descriptive Price List

Frank E. Davis Co., 43 Central Wf., Gloucester, Mass.

The World's Time is Waltham Time



Why Your Watch Selection should be a Waltham

TRAINS rush through space, ships sail the seas, people eat, work and play, and the tick of a timepiece guides them all. How necessary to the smooth-running schedules of efficiency that the watch should be accurate. How easy for you to secure, when buying a watch, the world's master timekeeper—a Waltham.

By merit only did Waltham win tributes from the nations of five continents. Horological experts select official watches without fear or favor. Calmly and scientifically they test and compare, looking through the surface of a watch into its works. It is there they find their answer.

But they discovered at Waltham their true ideal of what a perfect timepiece should be—a watch that outclassed in precision and reliability even the finest offerings of Switzerland, England or France. And with their verdict "the world's time became Waltham time."

Patent for Pendant and Bow applied for

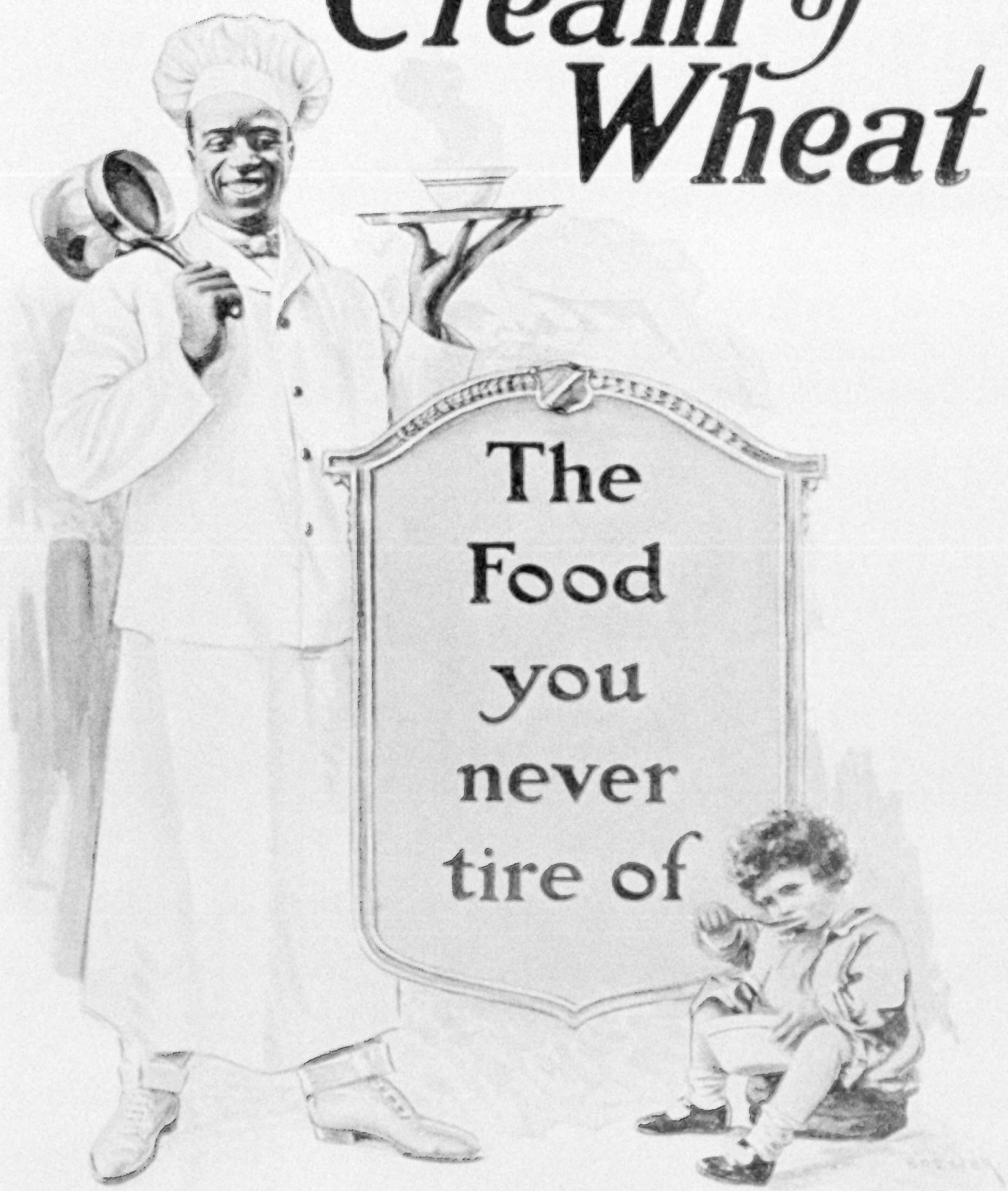
Visit a jeweler whose name stands for the utmost in quality. That is the man you desire to patronize, because you can depend on the value of any article he recommends. Ask him to place in your hand for inspection the Waltham Colonial A, illustrated on this page.

Here is a watch as precise as it is rich in the simple beauty of its refinement—extremely thin at no sacrifice of accuracy. Maximus movement 21 jewels—Riverside movement 19 jewels—Colonial A is an example of those methods of manufacture that have brought the world to Waltham for time.

WALTHAM

THE WORLD'S WATCH OVER TIME

Cream of Wheat



Painted by Edw. V. Brewer for Cream of Wheat Co.

Copyright 1918 by Cream of Wheat Co.

PRESS OF JUDD & DETWEILER, INC.
WASHINGTON, D. C.

XUM

Get the "Bright Brigade"

to do your

Housecleaning

Cheaper than Soap

Price Unchanged

Large Can 10¢